SCIENCE

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THE BERNE PHYSIOLOGICAL CONGRESS (I.).

THE third International Physiological Congress, held at Berne from September 9th to 13th, 1895, was attended by a larger number of physiologists than either of the previous meetings. The official lists of those who announced their intention of being present contained 154 names, and, though a few of these were prevented from attending, the representation from most of the European countries was very satisfactory. The United States, however, sent but two representatives.

The meetings were held in the new physiological institute named in honor of Switzerland's great physiologist the 'Hallerianum.' Here every facility was offered by Prof. Kronecker and his assistants, not only for the presentation of the regular communications, but also for the exhibition of apparatus and for physiological and microscopical demonstrations, which are really the most important features of such gatherings.

The social entertainments were numerous and well arranged. On the evening of September 8th an informal reception in the Gesellschaftshaus gave the members an opportunity of greeting each other and of making new acquaintances. On the following evening Prof. and Mrs. Kronecker received the members at their home and entertained them with private theatricals, dancing and an 'Abendessen' in the open air. The other social features of the Congress

were a concert in the Cathedral with a subsequent reunion in the Café du Pont, an excursion to the Schynige Platte (somewhat interfered with by bad weather), a subscription dinner followed by a ball and a reunion in the 'Festhalle' of the agricultural exhibition.

In the business session the Congress adopted rules for the admission of members to future meetings and voted that the next Congress should be held in Cambridge, England, in 1898.

The physiological proceedings were the following:

Monday, September 9th. Morning demonstrations and papers. (Chairmen, Profs. Chauveau and Bowditch.)

Dr. H. Boruttau (Göttingen) discussed the possibility of explaining the conduction of nervous impulses by purely electrical processes, and demonstrated on the polarizable 'Kernleiter' of Matteucci and Hermann with the aid of capillary electrometer and of reflecting galvanometer the production of a negative variation by tetanic sinusoidal 'stimulation,' and by rupture of the Kernleiter. With Hermann's rheotome, too, a wave of negativity was shown to be produced in the Kernleiter analogous to that of a nerve.

Prof. R. Ewald (Strassburg) showed a dog from the spinal cord of which a length of 158 mm., comprising the whole of the lumbar enlargement and a large part of the thoracic region, had been removed more than two years before in two operations. The alimentary canal continued its normal functions; the urine, free from sugar and albumen, accumulated in large quantities in the bladder, which emptied itself at intervals; vascular tonus had become normally restored; and there were no trophic cutaneous lesions. With the exception of the sphincter ani, which still functioned normally and retained electric excitability, the muscles supplied by the portion of the cord removed were completely degenerated. An animal similarly operated on bore young naturally, one of which was still alive, and suckled them.

Discussion by Profs. Kühne, Rosenthal and Holmgren.

Prof. E. Fano (Florence) demonstrated a myographic method for the measurement of reaction-time in the dog by which he had found that removal of certain regions of the cerebral cortex causes a shortening of the reaction-time, while electrical stimulation of the same regions lengthens it. He believes the conclusion justified that the cells of the cerebral cortex, especially of the frontal lobes, exercise an inhibition on the spinal cord.

Prof. N. Vitzu (Bucharest) had removed the occipital lobes of a dog's brain, and in the course of two years the consequent visual defect gradually improved. By a second operation of the same nature as the first, the animal became blind as before, while examination of the tissue removed showed it to be very vascular and to contain ganglion cells. These Prof. Vitzu held to be of new formation.

Discussion by Profs. Héger, Arloing and Herzen.

Dr. Demoor (Brussels) showed photographs and drawings of preparations made by Golgi's quick method of the cerebral cortex of dogs to which large doses of chloral or of morphine had been given. They showed a characteristic varicosity of the processes of the ganglion cells, absent in the case of unpoisoned and unexhausted animals, although killed in the same way. This action of the drugs in question was compared with a similar one exercised by them on the pseudopodia of amœbæ and on vegetable protoplasm. Dr. Demoor holds all three structures to be motile, a conclusion of interest in relation to the functions of ganglionic cells.

Dr. G. Mann (Edinburgh) discussed the

results of electrical stimulation of the cerebral cortex of the dog, cat, rabbit and hedgehog. He found that the method of relative arrangement of the different motor centers was in all the animals investigated essentially the same, although specific differences of location and of relative functional importance existed.

Mr. J. N. Langley (Cambridge) gave a general account based especially on his own researches of the sympathetic system, the fibres of which he classed as pre-ganglionic and post-ganglionic, according as they are central or peripheral (in relation to the central nervous system) to sympathetic ganglia. He discussed the nature of the 'reflexes' possible in sympathetic ganglia, and demonstrated such a one—stimulation of a post-ganglionic sympathetic trunk in the cat producing erection of the hairs covering a certain skin area. Stimulation of the corresponding pre-ganglionic trunk produced the same effect over a larger area.

Prof. J. Gaule (Zurich) gave the results of his investigation as to the growth of skeletal muscles. This is not continuous, but periods of increase are separated by periods of inactivity or even of decrease, in which crystals of calcium oxalate occur in the muscles. Faradic stimulation of long duration of the lower spinal ganglia caused in the periods of increase relative decrease; in the periods of inactivity relative increase.

Afternoon demonstrations and papers (Chairmen, Profs. Hensen and Mosso). Prof. A. Herzen (Lausanne) described the isolation of a dog's stomach made by himself and Dr. Frémont (Vichy), in a manner analogous to that of Thiry in the case of the small intestine. He showed some of the gastric juice obtained from the stomach; it was strongly acid, colorless and odorless, and capable of digesting its own weight of coagulated albumen. The amount daily secreted was 800 grams, which would correspond to 4 litres in the case of a man.

Prof. Herzen also described experiments tending to show that the spleen secretes internally a substance capable of developing digestive properties. The addition of blood from the splenic vein to pancreatic extract enables it to digest more actively ordinary arterial blood not having this action.

Discussion by Prof. Schiff.

Prof. M. Schiff (Geneva) gave the results of his investigation of the effect of local lesions of a bulbar pyramid. This does not produce degeneration of the corresponding crossed pyramidal tract or any motor disturbance.

Prof. R. Tigerstedt (Stockholm) described in detail his large apparatus for the investigation of the respiratory gaseous exchange. The respiration chamber has a content of 100 cubic meters and can contain several persons at once. Control experiments in which petroleum and stearin were burnt in the chamber showed an average error of 1.08%, *i. e.*, not more than that of Petterhofer and Voit's apparatus which was ten times smaller. Prof. Tigerstedt gave the results of an experiment on the effects of hunger made on himself and three others at the same time.

Discussion by Profs. Richet and Zuntz.

Dr. K. Gürber (Würzburg) described his modification of Hoffmeister's method for the preparation of crystals of serum-albumin from horse's serum. He had obtained four varieties of crystallized serum-albumin. If the crystals, after the removal of excess of ammonium sulphate, were heated to 67° C. in $\frac{2}{3}$–$\frac{3}{4}$% ammonium sulphate solution, they were coagulated and became insoluble without losing their crystalline form, although their power of double refraction disappeared, but returned after some weeks. Specimens of the crystals were shown under the microscope.

Prof. I. Rosenthal (Erlangen) demonstrated his Calorimeter.

Tuesday, September 10th. Morning

demonstrations and papers (Chairmen, Profs. Rutherford and Héger).

Dr. W. His, Jr. (Leipsic), discussed the mechanism of the heartbeat. He supported Engelmann's view of the purely muscular propagation of the contraction wave, not only in auricles and ventricles separately, but from auricles to ventricles also. He found in the rabbit, cat, dog and man a bundle of cross-striped muscle fibres, which if experimentally divided produces often a short arhythmic interval, a condition of allorhythmia in which auricles and ventricles beat at different rates. The muscular bundle in question contains no nervous elements. Dr. His was unable to confirm Stanley Kent's results.

Prof. K. Hürthle (Breslau) demonstrated his method for determining plethysmographically the blood pressure in man. An arm is first made bloodless by the Esmarch bandage, and is then introduced into a closely fitting india-rubber case connected with a 'Gummi-' or 'Federmanometer.' On re-entry of blood into the arm the pressure rises in about half a minute to its full length, a pulse curve being then recorded.

Discussion by Prof. Mosso.

Dr. K. Kaiser (Heidelberg) gave his views on the causation of the rhythmical contraction of the frog's heart, which he considers due to nervous apparatus. The heart muscle itself is unable to respond rhythmically to a constant stimulus, as has been hitherto supposed. Dr. Kaiser showed experiments on the frog's heart in favor of his views.

Discussion by Mr. Langley, Prof. Burdon Sanderson, Dr. His, Jr., and Prof. Schiff.

Prof. H. Kronecker (Berne) showed an experiment consisting in the injection of paraffin (of melting point 39° C.) into the peripheral end of the descending coronary artery of a full-grown dog. The ventricles at once entered into fibrillary contractions while the auricles continued to beat. Ligature of the artery does not produce this result. The conclusion drawn was that the normal heartbeat is brought about by the agency of nervous structures, easily affected by anæmia.

Dr. R. Magnus (Heidelberg) demonstrated his sphymograph, which is applied to the end of a dissected-out artery. Curves, the ordinates of which are proportional to pressures, were shown.

Discussion by Dr. Cow and Prof. Fredericq.

Prof. N. Zuntz (Berlin) demonstrated his method for estimating the velocity of the blood stream, consisting in the determination of the rate at which blood must be injected into the carotid artery during vagus standstill in order to bring back and maintain the average blood pressure.

Dr. A. Beck (Lemberg) gave an account of his experiments with Cybulski's photohæmotachometer to determine the velocity of the blood stream in the dog's portal vein. He found it to be 2,000–2,800 cubic millimeters per second, which corresponds to 620–780 c. c. per gram of liver tissue in 24 hours. There are slight respiratory variations, but only large variations of general blood pressure produce much effect on velocity of blood stream in the portal vein.

Afternoon demonstrations and papers (Chairmen, Profs. Tigerstedt and Wedensky.)

Prof. A. Dastre (Paris) discussed the gradual dissolving of fresh fibrin in strong solutions of neutral salts at 40° C., in which process globulins, albumoses and peptones are formed. He analogised this action to that of peptic and pancreatic digestion, of micro-organisms, of oxygenated water, and of sterile distilled water at high temperatures and pressures. The hydrolysis of proteids is a general process to which ferments are not necessary. Gelatin is similarly acted on by salt solutions.

Discussion by Drs. De Rey-Pailhade and Arthus.

Prof. W. Einthoven (Leyden) showed photographs of the regular excursions of a capillary electrometer produced by a tuning fork giving as many as 1,000 vibrations per second. The results obtained on the other hand with Appunn's steel lamellæ were so irregular that these are apparently unsuitable for investigation of the deepest perceptible tones.

Prof. C. Sherrington (Liverpool) and Dr. F. Mott (London) showed two monkeys. One of these had had the posterior nerve roots, with the exception of the 8th cervical nerve, divided down to the 2nd dorsal nerve, with no resulting sensory or motor disturbance. The other monkey had, in addition, the posterior roots of the 8th cervical nerve divided, and showed motor as well as sensory disturbances. It was demonstrated to the Congress that these disturbances were not due to injury of the pyramidal track for stimulation of the cerebral motor area caused movements of the fore limb.

Prof. J. B .Haycraft (Cardiff) described the change of shape of the heart in systole. It was very difficult to produce post-mortem systolic contraction of the heart, but this could be done by injection of mercuric chloride. The results obtained confirmed those of Ludwig and Hesse.

Prof. F. Gotch (Oxford) described the results of his investigations of the nature of the discharge of Malapterurus Electricus in response to mechanical and electrical excitation with the help of galvanometer and rheotome, of rheoscopic nerve-muscle preparation, and of capillary electrometer provided with shunt or condenser. Each discharge consists of three or four single shocks following one another at intervals of .004–.005 seconds, each of which has a duration of .002 seconds and an electromotive force of 120–200 volts. The succession of shocks is probably due to each shock stimulating the organ producing it to the production of a fresh one, and can be demonstrated with the organ isolated from the body.

Discussion by Dr. Boruttau and Prof. Rosenthal.

(*To be concluded.*)

AMERICAN ORNITHOLOGISTS' UNION.

THE Thirteenth Congress of the American Ornithologists' Union convened in Washington, Monday evening, November 11th. The business meeting was held at the residence of Dr. C. Hart Merriam. The public sessions, lasting three days, were held in the Lecture Hall of the U. S. National Museum, commencing Tuesday, November 12th.

William Brewster, Cambridge, Mass., was elected President; Dr. C. Hart Merriam and Mr. Robert Ridgway, of Washington, Vice-Presidents; John H. Sage, of Portland, Conn., Secretary; Wm. Dutcher, of New York City, Treasurer; Dr. J. A. Allen, Maj. C. E. Bendire, Frank M. Chapman, C. F. Batchelder, Dr. Elliott Coues, D. G. Elliot and Dr. A. K. Fisher, members of the Council. One active, one honorary, two corresponding and eighty-eight associate members were elected.

A communication was received from Dr. Ch. Wardell Stiles, delegate from the United States to the International Zoölogical Congress, requesting the Union to appoint a representative as a member of an Advisory Committee to which will be submitted all questions of nomenclature likely to be ruled on by the International Zoölogical Congress, to be held in England in 1898. Dr. J. A. Allen was so appointed.

The Committee on 'Classification and Nomenclature of North American Birds' reported the new edition of the Check-List as practically finished; it will be published in a few weeks.

In behalf of the Committee on 'Protection of North American Birds,' Mr. Wm. Dutcher stated that the same precautions

had been taken in 1895 as in 1894 regarding the protection of terns on Great Gull Island, New York. A game warden had been employed, several of the natural history societies in New York City contributing toward the payment of his salary. Absolutely no shooting had been done and parties who visited the island during the past year were prevented from collecting eggs.

Mr. Brewster said that the terns on Muskeget Island, Massachusetts, were steadily increasing in numbers, the result of protection. No birds had been shot on or near the island the past year. A notable increase was seen also in the colony of Laughing Gulls at the same place. Great credit is due Mr. Geo. H. Mackay for his continuous efforts in saving the gulls and terns on this island from destruction.

Mr. Witmer Stone knew of only one colony of terns on the New Jersey coast. As these birds nested back in the meadows and away from the coast, it was difficult to protect them. In recent years the 'eggers' had destroyed immense numbers of the eggs of the clapper rail which nested in favorable localities along the coast of New Jersey. This rail had increased the past season, as game wardens had watched the meadows and arrested several marauders.

Mr. Leverett M. Loomis remarked upon the wholesale destruction of birds and their eggs on the California coast during 1895.

Dr. Elliott Coues exhibited and explained a collection of unpublished water-color paintings of birds by Louis Agassiz Fuertes. The artist is a student at Cornell University and his work shows marked talent.

Tuesday evening, November 12, a special public memorial meeting was held in the lecture hall of the National Museum in commemoration of the two distinguished honorary members of the Union who have died the past year. The late Geo. N. Lawrence was eulogized by Mr. D. G. Elliot and Prof. Thos. H. Huxley by Dr. Elliott Coues.

The following is a list of the papers read at the sessions:

An Important Factor in the Study of Western Bird Life: Carl F. Baker.

On Pallas' Cormorant: F. A. Lucas.

Further Remarks on the Subgenus Quiscalus: Frank M. Chapman.

On Gätke's Heligoland: Geo. H. Mackay.

Food of the Meadow Lark: F. E. L. Beal.

Methods in Economic Ornithology with special reference to the Catbird: S. D. Judd.

Notes on the Birds of Idaho: M. J. Elrod.

The Pine Grosbeak (Pinicola enucleator) in Captivity: O. W. Knight.

Midwinter Migration Southward in the North Temperate Zone to Breeding Grounds: Leverett M. Loomis.

Why are there so few Bluebirds? Mrs. L. M. Stephenson.

On the Standing of Ardetta neoxena: Frank M. Chapman.

What Constitutes Publication? J. A. Allen.

The Value of the Tongue in the Classification of Birds: F. A. Lucas.

Introduced Birds: T. S. Palmer.

A Critique on Trinomial Inconsistencies: William Palmer.

The First Plumage of the Philadelphia Vireo (Vireo philadelphicus): Jonathan Dwight, Jr.

The Terns of Muskeget Island, Part II.: Geo. H. Mackay.

A Few Effects of the Winter of 1895 upon the Spring and Fall Migration in Canton, Mass.: J. H. Bowles.

Kingbird and Sapsuckers of Southern California: A. J. Cook.

Mr. Wm. Palmer gave an exhibition of lantern slides of birds, explanations being made by Messrs. Brewster, Palmer and Chapman.

The next meeting of the Union will be held in Cambridge, Mass., beginning November 9, 1896.

Jno. H. Sage,
Secretary.

GEOLOGIC ATLAS OF THE UNITED STATES (II.).

FOLIO 11, JACKSON, CALIFORNIA, 1894.

THIS folio consists of 2 pages of text descriptive of the Gold Belt, concluding with a generalized section of the formations of the Gold Belt, 4 pages of text descriptive of the Jackson tract, signed by H. W. Turner, geologist, and G. F. Becker, geologist in charge; a topographic map of the Jackson tract (scale 1:125,000), a sheet showing the areal geology, and a third of structure sections.

The area covered by the folio embraces a portion of the foot hills of the Sierra Nevada, chiefly in the counties of Amador and Calaveras, California. The area is drained by the Mokelumne and Calaveras rivers. The region is one of great economic importance, and comprises a portion of the rich belt of gold-quartz mines known as the Mother Lode. One of these mines, the Utica, at Angels' Camp, is said to be paying about one million dollars yearly at the present time.

There are two distinct series of formations represented in this area. The Calaveras and Mariposa formations, of sedimentary origin, and the associated igneous rocks form an older, highly disturbed series, on which a later series rests with a marked unconformity. This later series represents the Tertiary and Pleistocene periods.

The Calaveras formation, of Carboniferous age, is composed of slates, quartzite, mica-schists and limestone lenses, and contains frequent gold-quartz veins. The Mariposa formation, of Jurassic age, is largely made up of clay slate. There are two main belts of this formation, and in the eastern one occur many of the gold-quartz mines of the Mother Lode.

The igneous rocks associated with the Calaveras and Mariposa formations are of considerable variety, but only three form areas of great extent. These are serpentine, granite and the porphyrites (old andesites) and their tuffs. The serpentine is undoubtedly an altered form of basic igneous rocks (pyroxenite and peridotite), and is intrusive. The granite is likewise intrusive, cutting through all the older rocks except the Mariposa formation, and there is little doubt that it is later than this formation also, and in adjoining districts it invades the Mariposa slates as well. The porphyrites are largely altered forms of surface lavas and tuffs, resembling andesite and in part basalt, and these rocks, have been folded and compressed along with the sediments of the Calaveras and Mariposa formations. The areas called amphibolite schists on the geological map are chiefly metamorphic forms of these porphyrite tuffs.

The formation of the later series, resting on these older rocks, that deserves most attention is called the Auriferous gravel formation. These gravels, which are found chiefly on the ridge tops, were deposited in Neocene time by rivers. These old streams, as may be seen by inspecting the map, united into one trunk a little to the north of the Bear Mountains, and there found an outlet into the gulf that then filled the San Joaquin Valley. At many localities these old river gravels have been profitably mined for gold. Forming a capping to the gravels are usually beds of volcanic material, chiefly andesite and rhyolite.

The Calaveras formation is of economic importance as containing frequent gold-quartz veins and lenses of limestone. Most of the latter are noted on the geological map.

The Mariposa formation affords a good roofing slate, but is chiefly remarkable as containing, in Amador county and in the north portion of Calaveras county, the quartz veins of the Mother Lode.

The amphibolite-schist belts contain copper deposits and gold-quartz veins. In the southern part of Calaveras county, at Angel's Camp, the Mother Lode lies to the

east of the Mariposa slates and intersects a belt of amphibolite schist.

In the granite of the West Point are a are numerous gold-quartz veins, the ores of which contain a larger per cent. of sulphurets than the ores of the Mother Lode mines, and such ores are called base.

The serpentine areas contain chrome-iron deposits at numerous points.

The tuffs overlying the gravels at Mokelumne Hill, Valley Springs and other points have been found to make good building stone. Sandstone quarries are marked in the foot hills in beds of Tertiary age, and the deposits of the same age near Ione afford large quantities of clay for pottery, and of coal.

FOLIO 12, ESTILLVILLE, KENTUCKY-VIRGINIA-TENNESSEE, 1894.

This folio consists of 5 pages of text by M. R. Campbell, geologist, a topographic map of the district (scale 1:125,000), a sheet showing the areal geology, another showing the economic geology, a third of structure sections, and a fourth giving a columnar section north of Clinch River and another south of that river.

The territory represented by the folio is located principally in southwestern Virginia, though the southern portion extends into Tennessee and the northwestern portion into Kentucky. Its area is 957 square miles, four-fifths of which is in the Appalachian Valley and one-fifth in the Cumberland coal basin.

The surface features are quite varied. In the Appalachian Valley they consist of a succession of narrow ridges separated by equally narrow valleys, trending in a northeast and southwest direction. In the coal basin the ridges are less regular, but higher, reaching in two cases an elevation of over 4,150 feet above the sea level.

The region is almost entirely within the drainage basin of the Tennessee River. The principal tributaries of this stream are Holston, Clinch and Powell rivers, each of which is a stream of considerable importance. The Kentucky portion of the territory is drained by the headwaters of the Cumberland River.

The geologic structure of the region is complicated. In the Appalachian Valley the rocks have been squeezed, in a northwest and southeast direction, until they have been forced into great folds. These are generally overturned toward the northwest, and have in many cases been compressed to such an extent that they have broken, allowing one limb of the fold to be thrust over the other. These faults are of frequent occurrence in this region. Sixteen or seventeen can be counted on the geologic map. In the coal basin the folding is less severe, and the result is a broad basin in which dips are prevailingly light, and in many places the rocks are horizontal.

The intense folding of the strata has brought to the surface all of the geologic formations from the Carboniferous to the Cambrian. On lithologic grounds these are divided into twenty-two separate and distinct formations. As a result of the original folding and subsequent erosion, these formations show at the surface in long, narrow outcrops of limestone, shale or sandstone, which in the various folds are repeated over and over again. It is this repetition of the hard beds that gives rise to the numerous ridges which are such conspicuous features of Appalachian topography. In the coal basin the rocks are nearly horizontal, and hence they show in outcrop around the flanks of the mountains, or irregularly over the less rugged portions.

The mineral resources of this region are important, though at present but slightly developed. A belt of marble, varying considerably in composition and appearance, outcrops along the northern side of Clinch Mountain. Iron ore occurs in many parts

of this territory, both in the form of limonite and in that of hematite. Red fossil ore is found in the Rockwood formation in the northern part of the region, and it is mined on Wallen Ridge, south of Big Stone Gap. Coal is the principal mineral resource of this territory. It occurs in the structural basin north of Stone Mountain, and sparingly in the great arch of Powell Mountain, east of High Knob. The coal-bearing rocks are approximately 5,000 feet in thickness and include many seams of workable coal. In the vicinity of Big Stone Gap the Imboden seam is the most important. It has been traced over a large area on the Virginia side of the basin, where it varies from 3 to 16 feet in thickness. On this side there are a number of other seams of good quality, ranging from 3 to 7 feet in thickness, which could be easily worked. The Kentucky portion has also many workable seams, but at present, owing to lack of transportation, no mining has been done on a commercial scale.

FOLIO 13, FREDERICKSBURG, VIRGINIA-MARYLAND, 1894.

This folio consists of 5¼ pages of text, signed by N. H. Darton, geologist, and W J McGee, geologist in charge; a topographic map of the district (scale 1:125,000), and a sheet showing the areal geology.

The map represents an area of approximately 1,000 square miles of the Coastal Plain region of northeastern Virginia and the southwestern corner of Charles county, Maryland. It includes, in Virginia, King George and the greater part of Caroline and Stafford counties and adjoining portions of Spottsylvania, Essex and Westmoreland counties. The city of Fredericksburg is near the center of the western margin of the area. The Potomac River crosses the northeastern corner of the area, and the Rappahannock River extends diagonally across its center on a northwest and southeast line. The headwaters of the Mattapony River are in its southwestern corner. Along these river valleys there are wide, low terraces capped by the Columbia formation, of Pleistocene age. The intervening areas are plateau remnants capped by Lafayette deposits, of supposed Pliocene age. The underlying formations are the Potomac, Pamunkey and Chesapeake, which lie on an east-sloping floor of crystalline rocks. This floor rises to the surface and constitutes hills of considerable height in the northwestern corner of the tract; eastward it is deeply buried under the Mesozoic and Tertiary sediments. The Potomac formation, which is the basal member of these sediments, consists of a heterogeneous series of sands and sandstones with intercalated clays. Much of the sand is arkosic, and consists of detritus of crystalline rocks. The Pamunkey formation, which overlies the Potomac unconformably, is the representative of the Eocene in this region. It consists in greater part of glauconitic marls. These marls are important fertilizers, and in some portions of the region have been used with excellent results. They are overlain unconformably by the Chesapeake formation, which is of Miocene age. It is characterized by fine sands, marls and clays, portions of which consist largely of diatom remains. It is the same series that extends to Richmond, where its diatomaceous character was discovered many years ago, and to the northward through Maryland. It thickens rapidly eastward, and is nearly 1,000 feet thick in the lower Chesapeake Bay district.

The crystalline rocks consist mainly of granites and gneiss and an infolded belt of slates, to which the name Quantico slates has been given. They are not of value for roofing slates, so far as is now known. They appear to be a continuation of the slates in the belts west of Richmond in which lower Silurian fossils were discovered some time

ago, but no fossils have been found in the area of the Fredericksburg sheet.

FOLIO 14, STAUNTON, VIRGINIA-WEST VIRGINIA, 1894.

This folio consists of 4 pages of text, signed by N. H. Darton, geologist, and closing with a columnar section of the area; a topographic map (scale 1:125,000), a sheet showing the areal geology of the district, another showing the economic geology and a third exhibiting structure sections.

The area represented is about 1,000 square miles of central Appalachian Virginia. It comprises central and western Augusta county and portions of several adjacent counties. Staunton lies near the center of the eastern margin of the tract. About a third of the area is in the Great Valley of Virginia, and the remainder stretches halfway across to the Alleghany Mountains.

The geologic formations comprise members from the Shenandoah limestone of the Great Valley to the Pocono sandstone of Lower Carboniferous age. There are also some small dikes of diabase in the northwestern corner of the area. The region is one in which relatively gentle folds predominate. There is an overthurst fault which extends along the western side of the Great Valley for some distance, and several other faults traverse the Shenandoah limestone.

The geological classification does not differ materially from that outlined by W. B. Rogers, but geographic names have been applied to the formations. The name Shenandoah limestone has been selected for the great series of limestones of the valley. This series comprises several subdivisions, but in the Staunton region they merge so gradually that no attempt has been made to differentiate them on the map. The upper member contains a Trenton fauna, and it is thought that the basal beds of the series extends into the Cambrian, although no fossils have been discovered in them. Next, there is the representative of the Utica and Hudson shales, which has been designated the Martinsburg shale. It is overlain by the Massanutten sandstones, which comprise the Oneida and Medina in terms of the New York series. Next, there are the Rockwood formation and the Lewistown limestone, which include the formations between the Clinton and Lower Helderberg. The Oriskany and associated sediments are here represented by a stratigraphic unit to which the name Monterey sandstone has been given. The great series of Devonian strata lying above the Monterey has been divided into the Romney shale, Jennings formation and Hampshire formation. As they are not sharply separated from each other the patterns by which they are represented on the map are merged over a narrow zone along their boundaries. Only a portion of the Pocono formation is included in the stratigraphic column in this region.

The principal economic resources are iron ores, which lie on a local unconformity between the Monterey sandstone and the Romney shale, and limestone for flux. Some of the limestones are suitable for marbles, and at many points lime is burned for local use. There are several thin, irregular beds of coal in the Pocono sandstone, but they are not of economic importance. Brick and pottery clays in the Great Valley complete the list of economic resources.

FOLIO 15, LASSEN PEAK, CALIFORNIA, 1895.

This folio consists of 2 pages of text by J. S. Diller, geologist, descriptive of the Lassen Peak district, supplemented by two pages, with illustrations (9 figures), devoted to recent volcanic activity; a topographic map of the district, a sheet showing the areal geology and another showing the economic geology.

The Lassen Peak district is situated in

northern California, between the Sacramento Valley and the Great Basin, and adjoins the northern end of the Sierra Nevada. It is bounded by the 121st and 122d meridians and the 40th and 41st parallels, and contains an area of 3,634.4 square miles.

Within the district there are three distinct topographic features. Beginning at the west, it includes (1) a small portion of the eastern border of the Sacramento Valley, (2) the Lassen Peak volcanic ridge, and (3), upon the east, a portion of the Great Basin platform.

Twenty-two geological formations are shown upon the map. Thirteen of these were deposited by water as sedimentary rocks. The remaining nine are of igneous origin, and were erupted from the interior of the earth in a molten condition. Some of the sedimentary rocks, especially the younger ones, have not been materially changed since they were deposited, but others, such as the Auriferous slates, have been greatly altered or metamorphosed, and contain veins of quartz and metalliferous deposits.

By far the most abundant rocks of the Lassen Peak district are those of igneous origin. The numerous volcanoes of the district have furnished a great variety of such rocks.

Beds of unaltered stratified rocks, none of which are older than the Cretaceous, are still nearly horizontal; although uplifted, they have not been compressed enough to produce folds. On the other hand, the Auriferous slates have been thrown into a series of anticlines and synclines and so greatly compressed as not only to close the folds, leaving the strata in many cases approximately vertical, but also to break and displace them along a series of thrust faults during the earth movements by which the mountains were produced.

Upon the economic map special attention is called to the distribution of auriferous slates, in which alone there is any probability of discovering valuable deposits of precious metals. These rocks are exposed in the southeastern and northwestern portions of the area mapped, and extend through under the lavas of the Lassen Peak district from the Sierra Nevada to the Klamath Mountains of the Coast Range. The broad stretch of unaltered lavas about Lassen Peak does not contain any appreciable amount of precious metals, and may be wholly neglected by the prospector.

Among the auriferous slates seven formations have been distinguished, ranging in age from the Silurian to the Jurassic, inclusive. Of these the Cedar formation, of Triassic age, has been the most productive. By its disintegration it has furnished the gold for the placer mines of Indian Creek below Shoo Fly, of Soda Creek, Rush Creek, the north fork of Feather River and Dutch Hill. The Savercool mine, by the north fork of Feather River, is on this belt, and active prospecting is going on at a number of points. Numerous copper deposits have been discovered in the Pit River region.

Intermingled with the auriferous slates, there are eruptive rocks, such as diabase, porphyrite, peridotite and diorite, which have much to do in determining the distribution of certain classes of ore bodies. The areas of eruptive rocks have been outlined, and it has been found that the most promising prospects of that region are located near the borders of these eruptive masses. The ore deposits may be in the auriferous slates or the eruptive rock, but in either case they are not far from the contact.

Traces of coal have been discovered in the Chico and Ione formations, but no deposits of considerable value are yet known in the region of Lassen Peak. The Tuscan tuff has furnished some excellent material for chimneys, hearths and water coolers. The large deposit of diatom earth on Pit River, having a thickness of over 100 feet

and a length of several miles, is of economic importance for polishing, packing, making explosives and other purposes.

FOLIO 17, MARYSVILLE, CALIFORNIA, 1895.

This folio consists of 2 pages of text descriptive of the Marysville tract, signed by Waldemar Lindgren and H. W. Turner, geologists, and G. F. Becker, geologist in charge; a topographic map (scale 1:125,000) of the tract, a sheet showing the areal geology, another showing the economic geology and a third exhibiting structure sections.

The Marysville tract includes the territory between the meridians 121°30′ and 122° and the parallels 39° and 39°30′, and contains 925 square miles. The tract is located near the center of the Sacramento Valley. The larger part of it is occupied by the alluvial plains of the Sacramento and Feather rivers. The extreme northeastern corner includes the first rolling foot hills of the Sierra Nevada. In the center of the tract rises the isolated mountain group of the Marysville Buttes.

The alluvial lands consist of sands, clays and gravels, deposited by the shifting currents of the streams. The foot-hill region of the northeastern corner is principally occupied by the gravels of Pleistocene and Neocene age. The area composed of the bed-rock series of the Sierra Nevada is small and consists of diabase and porphyrite. The mountain group of the Marysville Buttes is an extinct volcano of probably late Neocene age, the internal structure of which is to a certain extent laid bare by erosion. The eruptive rocks of the buttes are andesites and rhyolites. In describing the structure of the group three parts may be distinguished: First, the central core of massive andesite and rhyolite; second, the upturned sedimentary rocks surrounding the massive core, evidently brought into their present position by the force of the ascending lavas; the sediments are of Eocene and Neocene age; third, the external ring of tuffs and breccias. The feature of greatest interest in connection with the Marysville Buttes is doubtless the presence of upturned sediments around the central core.

The shore gravels in the northeastern corner contain some gold and have been washed superficially. Somewhat auriferous gravels are also found in the upturned sediments of the Marysville Buttes. Coal and natural gas have been found in small amounts in the Marysville Buttes.

A GLACIER IN THE MONTANA ROCKIES.

The section of the Rocky Mountains lying between the Great Northern Railway and the international boundary has thus far been but little explored. Until the advent of the railway there was such difficulty in reaching these mountains that only an occasional prospector or trapper penetrated their fastness. As access has become easier it has been growingly evident that it is a region of remarkable scenic and geological interest. Thus far it has been reached largely from the eastern side, but this has been troublesome from the fact that skirting the eastern slope of the mountains is the great Blackfoot Indian reservation, over which it is impossible to travel without much annoyance.

Several glaciers have been known to exist in these mountains and two are located upon the military maps of the department of Dakota. The largest of these is known as the Grinnell glacier from Mr. George Bird Grinnell, who has made a number of expeditions into the region and has done more than anyone else to attract attention to it. The Grinnell glacier is not easily accessible and for some time efforts have been made to discover others which could be more easily reached by the ordinary tourist. About a year and a half ago Dr.

Lyman B. Sperry, of Bellvue, Ohio, became interested in the matter and determined to organize a party for exploration. In July last the party, consisting of Dr. Sperry; Mr. A. L. Sperry, of Owatouna, Minn.; Mr. E. R. Shepard, of Minneapolis, and the writer, with guides, pack animals and camp equipage, entered the mountains. I can best convey an idea of the region by following somewhat in detail the movements of the party.

The Great Northern road crosses the mountains about forty miles south of the international boundary, following on the western side of the divide the Middle Fork of the Flathead River. Twenty miles from the summit, at Two Medicine pass, is Belton station. Here there falls into the Fork a large and rapid mountain creek. It comes from McDonald Lake, three miles away in the mountains northward. From station to lake there is a mountain road over which a buckboard travels as often as tourists call for its service. The lake is already much resorted to, since its waters afford most excellent fishing and its shore unexcelled camping places. A small steamer makes regular trips over the fifteen miles of deeply blue water. The lake has a depth of twelve hundred or more feet in some parts and its surface is thirty-four hundred feet above sea level. The mountains along the sides of the lake are covered with pines to the summit. Near the northern end are several mountains of greater altitude, their summits rising above timber line and covered with great snow fields. The most prominent of these mountains have been named Mt. Lottie Stanton, Mt. Brown, Mt. Edwards and Mt. Sperry.

At the northern end of the lake several cabins have been erected and several packers and guides have established themselves to provide horses and other necessaries for travel. Our party, starting from this point, made its first essay into a small lateral valley discovered by a prospector sent out by Dr. Sperry a year ago. In June last Dr. Sperry penetrated the valley and found the avalanches falling frequently and such masses of snow upon the ground as to preclude any careful survey or any mountain climbing. The valley is called Avalanche Basin and is twelve miles from Lake McDonald, eight miles northward along McDonald Creek, thence four miles eastward to the main divide. The Basin is three miles long by one mile wide, much of its area filled with a delightful lake. Our attention was particularly drawn to this valley, in connection with our hunt for glaciers, because the lake had that peculiar milky appearance so characteristic of glacial water. In the valley we spent two weeks. A transit instrument had been packed in, and by means of it we measured carefully the heights of the surrounding mountains. The most prominent of them was found to be from twenty-eight hundred to five thousand feet above the surface of the lake, making the loftiest between nine and ten thousand feet above the sea. On every side the evidences of former glacial action on an immense scale were to be found. The strata, of gray and greenish shales and red slates for the most part, dip to the northwest. On the south side of the valley the exposed edges are scored and polished beautifully. Behind each 'sheep back' is a dazzling little pool of mountain water. To this series of pools we gave the name of Terrace Pools. Eastward from these pools is a slope which has been ploughed over and over by the ancient glacier and is now yearly harrowed by the avalanches. We twice made the ascent of the mountain at this place, reaching a point over nine thousand feet above sea level. From this point, at the foot of a still higher and very precipitous mountain peak, looking northward can be seen numberless peaks of the main range, while westward is the very distinct secondary range which

accompanies the main range for more than sixty miles. On the northward and eastward slopes are many large snow fields which might be the heads of glaciers, but which give no satisfactory evidences of being such in a distant view. We also endeavored to find a trail to the summit at the eastern end of the basin. The view from the point mentioned above suggested strongly that on the northeastern slope might be found several small glaciers. It was, however, found impossible to reach the summit by any route which we were able to try. It may still prove that the glacial looking water of Avalanche Lake is not misleading. Our evidence regarding it is wholly negative. While it may prove impossible to reach any glacier of importance by way of this valley, it must continue to be both to tourist and geologist a place of fascinating interest, for nowhere, so far as I am aware, are glacial phenomena on such a scale so easily accessible.

Being thus disappointed in Avalanche Basin, our party determined to try its fortune further north. Recently some mining properties have been located at a point where the main range, after trending almost due north from Lake McDonald for about thirty miles, suddenly sweeps around to the westward. To secure access to these properties those interested have cut a very good trail from Lake McDonald to their camps. The trail follows for a large part of the distance McDonald Creek, which flows along the valley between the main and the secondary ranges. By this route our party took up its march. The lower part of the trail rises slowly, but near the end it becomes steeper, although nowhere so difficult as to make it troublesome riding even for unaccustomed horsemen. We made our final camp near a group of mines in which development and locating work was going on. The group is called the International Camp. Its altitude is sixty-five hundred feet above the sea, and from it there is a wonderful mountain view, especially of the secondary range west and south. To the east there is a saddle of the main range some two thousand feet above the camp. To this saddle our attention was directed as affording access to the eastern side of the range, and our mining friends asserted that immediately over the divide a glacier was to be found. Accordingly the morning after our arrival we made the ascent, finding it not difficult and entirely practicable for saddle horses up to less than a thousand feet below the ridge and easily made passible for pack animals to the summit. We found the point where we crossed the divide to be 8,400 feet above sea level. Immediately on stepping down from the rocks on the eastern side of the range we were upon an immense snow field filling an amphitheater some four miles in diameter. While of greater extent than any which we had before visited it did not seem to be different, and we thought again that the glacier must be farther on. As we crossed the snow field to the east, there appeared running parallel with the curving wall of the amphitheater lines upon the surface whose significance we did not at first apprehend. Observation with the field glass soon indicated what closer examination afterward confirmed, that these were long crevasses in the ice. We then knew that we stood upon the upper snow fields of a glacier not of great size, but in many respects very typical. The crevasses first noted were found to be of varying width from one so narrow that the finger could scarcely be thrust into it to one some five feet across at its widest. In this we made soundings to the depth of forty feet, this being the length of all our available cord. From dropping stones into the crevasse we judged that it reached a depth of one hundred feet or more. Passing on to the eastern side of the amphitheater we ascended the rocky ridge which

formed its boundary. Then suddenly there burst upon us one of the most tremendous mountain scenes any of the party had ever had the good fortune to witness. Sheer down below was a cliff which repeated experiments with falling rocks showed to be more than sixteen hundred feet of perpendicular precipice. From the base of this cliff the talus sloped down sharply to the bottom of the valley no less than three thousand feet below. Across the valley in front of us towered a mountain ridge which we called the Bear's Teeth. It rose three thousand feet above us as the valley dropped below. Around the northern end of the ridge on which we stood swept the glacier narrowed into a true ice river. As it broke over the cliff to plunge into the valley it was fractured with crevasses of much greater size than those mentioned before. The largest was about twenty feet across and into it plunged one of the surface streams which came down the glacier. Below in the valley lay a succession of lakes. The first of so deep and dark a blue that without hesitation we called it Emerald Lake. The second, opposite the foot of the glacier, was of that peculiar milkiness thought to be always indicative of a glacier. For this Glacier Lake seemed the one appropriate name. The moraine at the foot of the glacier was evidently almost entirely ground moraine. There were very few large rocks lying in a mass of finely divided gray detritus. Across this rushed the stream which came from the foot of the glacier. Where the stream entered the lake the silt carried by it was borne out into the waters like the smoke from a cannon's mouth. In the time at our command it was not possible to descend the mountain to the level of the lakes, but they seemed to be of great depth with sandy and shingly beaches and closely surrounded on all sides by the forests of fir and hemlock.

From the point of our first observations of the valley we proceeded northward, crossing the ice river at the point where it left the main amphitheater to descend into the valley. At each point of vantage photographs were taken by Mr. Shepard. The writer and one guide descended along the northern margin of the ice about two thousand feet, finding some glacial scorings of interest, and under one edge several caves of considerable size. These were not of sufficient height to stand upright in, but extended for forty or fifty feet under the ice. The roof of clear blue ice was carved into low arches through which the light came, subdued into a wonderfully soft and grateful tone after the glare of the snow fields.

From this vicinity we had a most satisfactory view of the valley. The first portion of it passing athwart the foot of the glacier had a direction almost due north and south. Turning then to the east, it extended some eight or ten miles, flanked on either side by lofty mountains. Two of these particularly attracted attention. The dip of the strata in all this region, so far as observed, is toward the northwest. They consist of gray and yellowish shales and brilliant red slates. The two mountains in question have at their summits the outcroppings of two strata of red slates. This flaming head gear suggested the names North and South Red Mountain. Extending toward them were two more of the valley lakes, one of which, from its position, we called Centre Lake, and the other, six miles in length by three-fourths of a mile wide, seemed to deserve the name Long Lake. Still beyond Long Lake, its farther shore hidden by the foot of South Red Mountain, the fifth lake gleamed, a vivid contrast to the vermilion peaks on either hand. For the valley, as a whole, I have thus far sought vainly to learn the Indian equivalent for 'The Valley of the Five Lakes,' hoping that it might be something which would be musical and usable. From

other sources of information it seems that probably there are not five, but seven lakes in the valley. It may well, therefore, be nameless until more fully explored. It should be remarked in passing, that beginning with South Red Mountain, and extending northward, is a geological section of remarkable extent. No less than five miles in thickness of strata is presented before the observer with diagrammatic clearness.

Leaving the glacier we passed northward over a rocky upland where the 'sheep backs' testified of former glacial work on a tremendous scale. This led us into another amphitheater of smaller dimensions than the one occupied by the snow fields of the glacier. In this basin, eight thousand feet above sea level, a small lake met our sight. The mountain wall on its western shore was covered by what may be called glacial snow fields. These fields were of sufficient extent to be partially compacted into ice. As these ice masses moved down into the lake great cakes were broken off after the manner of icebergs where glaciers descend into the sea. This lake we called Summit Lake.

The outlet of this lake dropped by a series of cascades into a deep valley on whose far side rose a mountain of such form that Pyramid Mountain must be its name.

Returning from Summit Lake we crossed the snow fields, again traversing nearly its greatest diameter. Noting the time required gave a basis for estimating this diameter at about three and one-half miles. We also examined the lateral moraine, finding it to consist of basaltic fragments mainly of large size. There appeared to be considerable mineral bearing material in this mass. A surface moraine of yellow slate was of considerable interest. An enormous mass of rock had evidently fallen upon the surface of the ice from the overhanging mountain. Through and under it were a number of water-worn tunnels of curious form, which I did not have time to examine with care.

Some crude observations were made as to rate of movement. Between two days there seemed to be a movement of the center of the mass of about two inches. This is not reliable, however, since conditions for accuracy could not be supplied.

To the peaks north and south of the ice field we gave the names of Mt. Blanchard and Mt. Cunningham, in honor of the guides who had served us during the expedition.

At some future time I hope to return to this region and extend these explorations further. In the meantime I commend it to those who wish to study mountain forms or glaciers and glaciation. There is an abundant and very interesting fauna and flora to be investigated, and on every side the majesty and glory of one of the noblest mountain ranges. In accessibility, in varied interest, in all which may attract either the lover of splendid scenery or the devotee of scientific exploration, no American or foreign locality is more enticing.

L. W. Chaney, Jr.

Carleton College, Northfield, Minn.

THE HUXLEY MEMORIAL.

The first meeting of the general committee formed for the purpose of establishing a memorial to Huxley was held in the Museum of Practical Geology, London, on the afternoon of November 27th. We take from the detailed report in *The Times* the following particulars:

The chair was occupied by the Duke of Devonshire, who opened the proceedings by referring to the official side of Huxley's career, stating that he did this as the official head of the Science and Art Department. Prof. Huxley immediately after leaving the Navy, in which he commenced his career, succeeded, in 1854, Prof. Forbes as Lecturer on Natural History in the Central School of Science in Jermyn-street.

This school subsequently became the Royal School of Mines. It was transferred to South Kensington in 1881, and there merged in the Royal College of Science. Prof. Huxley was the first Dean of the College, and on his retirement from the public service, in 1885, he was requested by the heads of the Department to retain the office in an honorary capacity, and that he did to the day of his death, attending the meetings of the Council and giving assistance in other ways. He was also honorary professor of biology in the College and retained a general charge of the biological section. While professor at the College he developed his system of biological teaching, which has had so marked an influence on biological teaching in all parts of the world. On his retirement, in 1885, he presented to the College his large and valuable collection of books on natural history. The room which he occupied was, by the authority of the Lords of the Committee of Council on Education, devoted to a Huxley biological laboratory for research, and it is in constant use by advanced students of biology. A scholarship has been endowed in connection with the College, and the history of the endowment may be of some interest. Prof. Huxley on one occasion met in society Miss Marshall, daughter of Mr. Matthew Marshall, for many years chief cashier of the Bank of England, and in consequence of her conversation with Prof. Huxley on that occasion Miss Marshall left to the department a large number of books and other instruments, and in addition a bequest of £1,000, from the proceeds of which a scholarship has been endowed. Prof. Huxley was for more than 40 years intimately connected with the Science and Art Department. The museum in Jermyn-street, in which we are met to-day, is a section of that department, and both in the lecture theatre and in the class-rooms upstairs Prof. Huxley for many years delivered his lectures. It was almost my first duty—and I need not say my painful duty—on becoming President of the Council to address, on behalf of the Committee of Council on Education, a letter of condolence to Mrs. Huxley, in which the committee placed on record its high appreciation of the services to science and art rendered by Prof. Huxley, in the capacities to which I have referred and on the many inquiries by Royal Commission in which he had taken part.

Prof. M. Foster said that the history of the movement for a memorial to Prof. Huxley, he thought, would be of interest. The movement was initiated by a few friends of Prof. Huxley, who met at the Royal Society, and a provisional committee of representative men was formed. The invitations which they issued to a large number of influential persons to form a general committee were cordially accepted, and the Prince of Wales consented to join the committee and undertake the duties of honorary president. At that time it was too late in the summer to take active steps; so the meeting of the general committee was postponed till the present date. The provisional committee had given much time to the consideration of the form which the proposed memorial should take, but, of course, the decision would rest with the general committee.

Lord Kelvin then moved the following resolution:

"That it is desirable to establish a memorial to the late Right Hon. T. H. Huxley." He said that, as an original investigator in biology, Huxley had, by his life-long perseverance in work for the increase of knowledge, left to the world a monument more enduring than any bronze or marble in which his survivors might give material expression to their gratitude. Of his originality Huxley gave early proof. His first writings were not done in a

scholastic manner, but were inspired by the innate fire and determined purpose of the man, and were the beginning of a long series of memoirs which made Huxley's name famous throughout the scientific world, and won for him early recognition as one of the first biological investigators of the day. In comparative anatomy Huxley's work was of immense value, and he almost created a new era in biological science by the great advances which he made in the new morphology. The instruction in morphology and general biology which students of Huxley's day could not obtain in any medical school or university was now regularly and systematically given, to the great advantage of medical science, of science in general, and of those who wished to understand the grandeur and beauty of nature, and what lay under it. Huxley also entered upon the subject of geology and paleontology, and there he had left results of an enduring character. His important contributions to the great and newly-developed science of evolution were well known, and only needed to be mentioned to indicate how much science owed to Huxley. But he was not a man who was merely a specialist, content to work out his special subject in the complete and thorough manner which characterized all his work. From the first he had a mind which must extend into philosophic thought; his moral lessons from biological work extended even into the field of politics. His contributions to thought in respect of theology were themselves such as would put Huxley's name and fame in a very high position indeed. He sacrificed his ease, his health and his time primarily for the advancement of science, but ultimately for the object which he felt to be even greater than the advancement of science—the promotion of the moral and material welfare of mankind. And that being the case, who could deserve a monument better than Huxley?

Mr. A. J. Balfour, in seconding the resolution, referred more especially to Huxley's contributions to the doctrine of evolution. He said that in the critical period of scientific history which followed the publication of the 'Origin of Species,' in 1857, the man who did more than any other man, perhaps, to stimulate public interest in the subject, to bring into line all the younger scientific thinkers of the day, to inspire them with his ardor, with his beliefs, and with his convictions, was probably Huxley. That is no small title to fame. If it be the fact, as I think it is, that it is now the common property of all educated men to look on this material world in which we live from the evolutionary standpoint, if that is a matter of common knowledge, belief and conviction, as I think it is, we owe that, not to the great original investigators who started the theory, but to those who, like Professor Huxley, did so much by their scientific discoveries to support it, and even more by their preaching and example to spread it among all classes of their fellow-countrymen. There were other questions never far absent from the mind of Prof. Huxley, as any one who knows his work will admit, on which he has left few positive results, and concerning which differences of opinion exist. But there ought to be no difference of opinion as to that great claim on our consideration; and that, even if it stood alone, dissociated from his literary and strictly scientific work, would, in my judgment, be quite sufficient justification for this meeting, and for us to use every exertion to carry into effect the resolution which it is my honor and duty to second.

Lord Playfair, in supporting the resolution, said that it had been his privilege to be associated with Prof. Huxley in many of his labors as a public man. The present position of technical education owed very much to the advocacy and scientific labors

of Prof. Huxley; and up to the time of his last illness he was actively interested in the establishment of scientific scholarships in almost every college in the United Kingdom, and of the Indian Empire and the colonies. One whole autumn he had spent on a gunboat with Prof. Huxley, in connection with the Royal Commission on the Fisheries of the Coast, and his labors, assistance and knowledge in that inquiry were most valuable. He did not wish to overrate Prof. Huxley's labors as a public man in comparison with his scientific work. Discoveries in abstract science were of far greater service to humanity than the labors performed for one particular generation. But public work had done much to make Huxley's name loved by the people; and it was right to ask the people, for whom in his generation he had done so much, to join in making the memorial worthy of him.

Sir Joseph Hooker moved: "That the memorial do take the form of a statue to be placed in the Museum of Natural History, and a medal in connection with the Royal College of Science; and that the surplus be devoted to the furtherance of biological science, in some manner to be hereafter determined by the committee, dependent upon the amount collected." He said that he and Prof. Huxley entered the public service together as volunteers. The choice lay between them for the appointment to the Rattlesnake, and when Huxley returned from that cruise a friendship sprang up between them that had lasted for 40 years; and he owed his success in scientific life to the advice, stimulus and example of Huxley. He was sorry to say that Huxley's services to science were more appreciated abroad than even in this country. In the committee lists, which included more than 700 names, the foreign acceptances were more numerous than those at home. He hoped this state of things would speedily be remedied. The provisional committee had thought of publishing, in a series, Huxley's scientific papers; but that was no longer necessary, as Messrs. Macmillan had written that they were prepared at their own risk to publish Huxley's papers in a collected, memorial form, provided that the committee would appoint some one to supervise the series. Messrs. Macmillan had promised to defray the cost of editing.

Mr. Leslie Stephen, in seconding the resolution, said that a high sense of personal gratitude to Huxley moved him to take part in this meeting. In a friendship of nearly 40 years Huxley had shown to him exceptional kindness on more than one occasion. Huxley was a man not only to be honored for his intellectual power, but to be loved for his masculine, affectionate nature. Lately he had read through Huxley's collected works, and he was convinced that when the history of this time came to be written, Huxley would find a place, not only among the leaders of the most characteristic scientific movement of the day, but also as one of the very first writers of English.

Mr. Alma-Tadema moved the following resolution:

"That the persons named in the list which has been circulated do form a general committee, and that the following 20 persons be selected to form an excutive, with power to elect its own chairman, and to add to the number of the general committee: Sir J. Lister, Prof. M. Foster, Lord Rayleigh, Prof. E. Frankland, Sir J. Evans, Sir W. Besant, Sir J. Donnelly, Sir J. Fayrer, Sir W. H. Flower, Sir A. Geikie, Sir J. Hooker, Prof. E. Ray Lankester, Prof. J. N. Lockyer, Mr. Briton Riviere, Dr. P. L. Sclater, Sir H. Thompson, Mr. Spencer Walpole, Lord Shand, Sir John Lubbock and Prof. G. B. Howes."

Prof. G. B. Howes said that the sum already received in subscriptions to the memorial was £213, while £344 more was promised, making a total of £557.

CURRENT NOTES ON ANTHROPOLOGY (XV.).

ANCIENT MEXICAN MOSAIC WORK.

SLIGHT attempts at inlaying with shells, mica and the like, are not unfamiliar in the art of the northern native tribes of America; but nowhere else on the continent was the technique so developed as in Mexico. This is beautifully illustrated in an excellent monograph by Mr. Charles H. Read, of the British Museum, in 'Archæologia' (Vol. LIV.), on 'An Ancient Mexican Head-piece coated with Mosaic.' His scope is much more extensive than his title. Not only does he describe accurately the piece referred to, and give a large colored engraving of it, but he deals with all the known and accessible relics of the kind, eight in number, figuring and explaining them minutely. As it has long been doubted whether true turquoise is to be found in Mexico, Mr. Read adds a note from Mr. Rudder, of the Museum of Practical Geology, in which that question is answered positively in the affirmative. This monograph should be consulted by all who would understand the real advances made by the Nahuas and their neighbors in the fine arts.

EUSKUARIAN ETHNOLOGY.

FEW ethnic problems are more complicated than that of the Euskuarians, or Basques, of the Pyrenees.

The lexicon of their language is practically Aryan, while its grammar is as un-Aryan as could well be imagined; physically they differ from their neighbors in well-defined traits, and also between each other in a not less positive degree.

A most valuable contribution on the somatologic side has appeared recently in L'Anthropologie by Dr. R. Collignon, surgeon-major in the French army and a distinguished anthropologist. He succeeds in clearing away the obscurities arising from the misapprehensions of Broca and other older observers, and establishes the real Basque type. His conclusion is, "that the true physical traits of the Basques attach them indisputably to the great Hamitic branch of the White Race, to that represented by the Berbers and ancient Egyptians; and not at all, as some have argued, to the Esthonians or Finns. The Basque affinities are North African or European, certainly not Asiatic."

This conclusion, thus announced by one of the highest authorities, is substantially that expressed in my 'Races and Peoples,' published in 1890 (page 142).

MAYAN HIEROGLYPHICAL STUDIES.

IT is pleasant to note the amount of attention now shown to the decipherment of the hieroglyphical writings of the ancient Mayas. A brief notice of some late papers on this branch may be welcome.

In July Dr. E. Förstemann issued the fifth part of his researches entitled 'Zur Entzifferung der Mayahandschriften.' It is devoted to a definition of the astronomical and ritual years of the Mayas, based largely on analyses of the Dresden manuscript.

An article by Dr. E. Seler, in Globus, Bd. 68, No. 3, is upon the significance of the Maya calendar for the historical chronology of Yucatan. It is characterized by that keen-sighted erudition which Dr. Seler possesses, and is a contribution of great merit.

The same writer, in the Verhand. der Berliner Anthrop. Gesell. has discussed the bat-god of the Mayas and also explained the symbols and glyphs on a vase found at Chamá by Mr. Dieseldorff.

The American Anthropologist for July contains a careful article by Mr. J. Walter Fewkes on "The god 'D' in the Codex Cortesiànus." He differs from the conclusions I have expressed in my 'Primer of Mayan Hieroglyphics,' and the question is probably not closed by either of us.

D. G. BRINTON.

UNIVERSITY OF PENNSYLVANIA.

SCIENTIFIC NOTES AND NEWS.

LETTER OF THE LOCAL COMMITTEE OF THE SCIENTIFIC SOCIETIES.

Geological Society of America, American Society of Naturalists, American Physiological Society, American Morphological Society, Association of American Anatomists, American Psychological Association.

COMMITTEE:

PROF. E. D. COPE, *Chairman*, 2102 Pine Street (Am. Morph. Soc.).

DR. HORACE JAYNE, *Treasurer*, 19th and Chestnut Streets (Am. Soc. Nat.).

DR. HARRISON ALLEN, 1933 Chestnut Street (Assoc. Am. Anat.).

DR. EDW. T. REICHERT, Univ. of Pa. (Am. Phys. Soc.).

DR. W. R. NEWBOLD, College Hall, Univ. of Pa. (Am. Psy. Assoc.).

DR. PERSIFOR FRAZER, *Secretary*, 1042 Drexel Building (Geol. Soc. Am.).

PHILADELPHIA, November, 1895.

DEAR SIR: Every member of each of the above Societies will be notified by the appropriate Secretary of the date of meeting of his Society in Philadelphia. The meetings will be held in the University of Pennsylvania's grounds, either in the College Hall or in the building of the Department of Medicine.

The headquarters for all visiting members will be the Hotel *Lafayette*, situated on Broad street below Chestnut, a very short distance from the terminal stations of the Pennsylvania and Reading railroads. Its rates are $1.00 and upward per day on the European plan, $3.00 and upward on the American plan. The *Bellevue*, *Stenton* and *Stratford*, $2.00 to $5.00 (European plan); the *Metropole*, $1.50 and upward (European plan), and the *Colonnade*, $3.50 (American plan), are near by. The *Continental*, $1.00 and upward (European plan) to those presenting this circular, and $2.25 and upward (American plan), and the *Girard*, also $2.25 (American plan), are both at Ninth and Chestnut streets. The *Bingham* House, at Eleventh and Market, opposite the Reading terminal station, charges $2.50 (American plan). All these hotels are either directly on or not more than a block from the trolley cars which go directly out to the University grounds on Walnut and Market streets and return on Chestnut and Market. The time required from the hotels to the University grounds should be less than 25 minutes.

The Trunk Line Association has granted the usual reduction of one and one-third fares for the round trip to those attending the meeting, and provided with certificates to be obtained from the ticket agents, who sell tickets from the points of departure to Philadelphia at one full fare each. These tickets must state that the object of making the journey is to attend the meeting of the ——— Society at Philadelphia. The certificates must be viséd by a representative of the local committee and of the Trunk Line Association, at the College Hall on December 27 or 28. The Secretary of the local committee has given his personal pledge to redeem at full fare any such tickets that may subsequently be found in the possession of 'scalpers.'

In order to facilitate the work, members are requested, as soon as possible after arrival, to register their names and the Society to which they each belong with a clerk who will be in attendance in College Hall.

A subscription dinner of the members of all the Societies, at $2.00 per plate, will be given at the Hotel *Lafayette*, on the evening of Friday, December 27, 1895. You are requested to send word if you desire to participate in this dinner, and to pay the sum of $2.00 to the Treasurer, Dr. Jayne, or his designated agent in College Hall, not later than noon on December 27, for each place which you wish reserved.

On Thursday evening, December 26, from 8 to 9 o'clock, Prof. Wm. B. Scott, of Princeton, will deliver an illustrated lecture before the visitors at the Hall of the Academy of Natural Sciences, 19th and Race streets, on 'the history of the lacustrine formations of North America and their mammalian fossils,' after which Dr. Horace Jayne will receive the members of the visiting Societies at his house, 19th and Chestnut streets.

DR. PERSIFOR FRAZER,
Sec'y Local Committee,
1042 Drexel Building, Philadelphia.

THE METRIC SYSTEM IN GREAT BRITAIN.

A DEPUTATION from chambers of commerce and other bodies waited on Mr. Balfour, First Lord of the Treasury, on November 20th, urging that the government carry out during the next session of Parliament the recommendations made by a committee of the House: That the metric system of weights and measures be at once legalized for all purposes; that after a lapse of two years the metrical system be rendered compulsory by Act of Parliament; that the metrical system of weights and measures be taught in all public elementary schools as a necessary and integral part of arithmetic, and that decimals be introduced at an earlier period of the school curriculum than is the case at present. Sir A. Rollet, who introduced the deputation, said that of sixty-eight chambers of commerce all but one favored the memorial. The present system was obsolete and disastrous to British trade, leaving it in a position of isolation. No proposal was made in regard to the coinage at present. Speeches were made by others, including Sir Samuel Montague, who said that if England adopted the metrical system the United States would also do so. Mr. Balfour in his reply expressed complete concurrence with the first and third propositions. He, however, thought that there would be very great difficulty in compelling every class in the community suddenly to alter its habitual practice in the weights and measures in which it deals. Mr. Balfour concluded by saying that while he looked forward to the time when the change could be made, he would like private enterprise to show that this can be done without inconvenience, and that it carries with it all the benefits which he, in common with them, attached to the metric system, and which it is absolutely impossible to associate with the arbitrary, perverse and utterly irrational system in which they had the misfortune to grow up. It follows from Mr. Balfour's address that that metric system will be at once legalized and instruction in it required in all schools, but that its general use will not be made compulsory at present.

PRESERVATION OF FORESTS.

THE report of the Hon. Hoke Smith, Secretary of the Interior, pays special attention to irrigation and preservation of the forest. Mr. Smith says that there have been reserved from settlement, under the act of March 3, 1891, 17,000,000 acres of land as forest reserves. The object of these reservations is to preserve the forests themselves for future use, and through the preservation of the forests to protect and reserve the supply of water, so that it may be stored and utilized for irrigation. These forest reserves protect the head waters of many of the streams used for irrigation. If the depredations upon them continue at the present rate, they will, in a few years, be entirely denuded of their timber, and will thus leave the lands surrounding the head waters of irrigating streams subject to the direct rays of the sun, causing waste through floods at an early season of the year and the loss of benefit to the agricultural lands when the water is needed later. If, however, the timber lands are protected and kept intact, the melting of the snow will be gradual, floods will be prevented, and a flow will be maintained until late in the spring. The force of the General Land Office is, however, inadequate to protect the general reservations and the permits for cutting timber authorized by law have been much abused. Mr. Smith recommends the appointment of special agents to protect the forests against fire and depredation and that a rational system of timber cutting under competent supervision be substituted for the present system of timber permits. Mr. Smith thinks that it would be desirable to obtain, under the provisions of the constitution of the National Academy of Sciences, a report from that body upon the general subject of forestry administration in this country, particularly if it were possible for them to employ experts to collect statistical information as to the area, location and character of the wooded lands belonging to the United States.

FAST TRAINS IN GREAT BRITAIN AND THE UNITED STATES.

THE following are the tabulated figures of two fast runs in this country and of the record-breaking run, to date, in Great Britain, as made up by the Lake Shore Railway, which holds the record for the world. The second table is

published by the *Railway Master Mechanic* in its issue for November.

WORLD'S RECORD.

	Lake Shore & Mich. South.	N.Y. Central & H. R. R.	West Coast Route.
Date	Oct. 24, 1895	Sept. 11, 1895	Aug. 22-23, '95
No. of cars	3	4	3
Weight of cars	304,500	358,310 lbs.	150,080
Starting point	Chicago	New York	London
Finish	B'ffalo Creek	East Buffalo	Aberdeen
Total distance in miles	510.1	436.32	539.75
Total time in minutes and seconds	481 m. 7 s.	411 m. 56 s.	512 m.
Average speed in miles per hour	63.614	63.55	63.25
Total time in motion	470 m. 20 s.	407 m. 41 s.	505 m.
Average speed deducting stops	65.07	64.22	64.12
Length of division on which fastest average speed was made	86	145.6	141.25
Average speed on said division	72.92	65.75	67.50

DETAILS.—L. S. & M. S.

1 mile	was made at the	rate of	92.3	miles	per	hour
8 consecutive miles	"	"	85.44	"	"	"
33 "	"	"	80.6	"	"	"
85 "	"	"	72.92	"	"	"
181.5 "	"	(including stops)	68.67	"	"	"
181.5 "	"	(deducting stops)	69.67	"	"	"
289.3 "	"	(including stops)	65.14	"	"	"
289.3 "	"	(deducting stops)	66.68	"	"	"
422.7 "	"	(including stops)	64.45	"	"	"
422.7 "	"	(deducting stops)	65.89	"	"	"
510.1 "	"	(including stops)	63.614	"	"	"
510.1 "	"	(deducting stops)	65.073	"	"	"

In the last trial the work was done so easily, and the train moved so smoothly, that it is thought that the figures may be considerably improved upon. The English run included but two stops, the New York Central run three, and the Lake Shore five. The latter employed engines with steam cylinders 17 by 24 inches; the Central used 10 by 24, and the British engines were all larger. The Central train weighed over 250 tons, including engine; and the English, unusually light, even for English trains, weighed less than one-half as much. The latter could not carry passengers enough to pay costs; the former could carry 218 passengers. Neither, however, carried an ordinary load. The American line holds the record for a single, special, fast run over a long route, as well as that for a single mile—over 100 miles an hour by engine '999'—while the English, 'West Coast,' road has the fastest regularly scheduled long-distance train.

GENERAL.

THE annual meeting of the American Mathematical Society will be held at Columbia College, New York, on Friday afternoon, December 27th. The following nominations reported by the Council will be acted upon: President, Dr. G. W. Hill; Vice-President, Prof. Hubert A. Newton; Secretary, Prof. F. N. Cole; Treasurer, Prof. R. S. Woodward; Librarian, Prof. Pomeroy Ladue; Committee of Publication, Prof. Thomas S. Fiske, Prof. Alexander Ziwet and Prof. Frank Morley; Members of Council to serve until December, 1898, Prof. E. W. Hyde, Prof. W. Woolsey Johnson and Prof. B. O. Peirce. The President, Dr. G. W. Hill, will deliver an address at this meeting entitled 'Some Remarks on the Progress of Celestial Mechanics since the Middle of the Century.' Further information may be obtained from the Secretary, Prof. Thomas S. Fiske, Columbia College.

THE American Physiological Society will hold its eighth annual meeting in Philadelphia, Pa., on Friday and Saturday, December 27th and 28th, 1895. The sessions will be held at the University of Pennsylvania and at Jefferson Medical College. A Smoke-talk will be held upon the evening of Thursday, December 26th. The headquarters of the Society will be at the Lafayette Hotel, Broad street, near Chestnut street. Members of the Society will please inform the Secretary, Prof. Frederic S. Lee, Columbia College, at their earliest convenience whether they intend to be present at the meeting and what communications they desire to make. Those who will require apparatus or other necessities for the making of demonstrations will please communicate with Dr. E. T. Reichert, University of Pennsylvania.

THE American Psychological Association will meet at the University of Pennsylvania, on Friday, December 27th, at 10 A. M., and will continue in session through Saturday afternoon. Members should notice the information regarding local arrangements and railroad rates given in the circular issued by the local committee. On Saturday morning at 10 o'clock there will be a discussion on 'Consciousness and Evolution,' in which Profs. James, Cope, Baldwin and Dewey are expected to take part.

A STATUE in honor of Pasteur will be erected at Melun, near Fontainebleau, to commemorate his experiments in vaccinating sheep suffering from anthrax, which were first made in that district.

THE great Bruce photographic telescope having been tested at the Harvard Observatory will shortly be forwarded to the branch of the observatory in Arequipa, Peru. It will be taken by a steamship from New York to Molendo, whence it must be transported a distance of about 75 miles by rail and 3 miles by road, which latter causes the most serious difficulties. It is proposed to undertake systematic series of photographs of the heavens, which, owing to the great power of the instrument and its favorable position in the southern hemisphere, will undoubtedly yield results of much scientific importance.

DURING the month of December the presidents of the Washington Scientific Societies deliver the annual addresses which are as follows: The Philosophical Society, 'Alaska as it was and is, 1865–95,' W. H. Dall; The Geological Society, 'The Origin of Hypotheses,' G. K. Gilbert; The Biological Society, 'The Practical Results of Bacteriological Researches,' George M. Sternberg; The Entomological Society, 'On the Phylogeny of Hymenoptera,' William H. Ashmead.

IT is reported that Prof. Dyche, of Kansas University has practically decided to make another trip to the Arctic Ocean, having received an offer of assistance from a source which he declines to name. His plan is to follow the west coast of Greenland, and then attempt to reach the pole by sledge or boat.

DR. EUGENE DUBOIS exhibited before the Anthropological Society of London on November 25th the remains which he has named *Pithecanthropus erectus*. In the discussion which followed, Sir W. H. Flower said that the fragments were so few that the essential point of difference between the human and the authropoid forms could not with certainty be defined, but it showed more tendencies to the man side than any other remains he had ever seen.

MR. ROBERT T. HILL, Geologist U. S. Geological Survey, will deliver, in the Catholic University of Washington, seven lectures on General Geology, illustrated by the lecturer's researches in the United States, Mexico and Central America. The subjects are as follows:

December 5th.—'Modern Objects and Methods of Geologic Research.'

December 12th.—'Origin of Topographic Form.'

December 19th.—'Migrations of Land and Sea, as Exemplified in the Geologic History of the Gulf of Mexico.'

January 9th.—'The Mountain Systems of America.'

January 16th.—'The Great Plains and Basins of the Western Hemisphere.'

January 23d.—'The Relation of Geology to Civilization.'

January 30th.—'Future of Geologic Research in the Americas.'

IT is stated that Pasteur's will reads as follows: "This is my testament. I leave to my wife all that the law allows me. May my children never forsake the path of duty, and always cherish for their mother the tenderness she so richly merits. L. Pasteur."

DR. D. G. BRINTON and Dr. William Pepper have been nominated for the vacancy of vice-president of the American Philosophical Society caused by the recent death of Dr. W. S. W. Ruschenberger. Dr. Persifor Frazer and Mr. Patterson DuBois have been nominated for the secretaryship, vacant through the death of Henry Phillips, Jr. The elections take place in January and are exciting much interest in members of the Society.

THE Columbia University Press is shortly to publish an 'Atlas of Nerve Cells,' by Prof. M. Allen Starr, professor of diseases of the mind and nervous system in the College of Physicians and Surgeons. The illustrations were prepared with the assistance of Dr. O. S. Strong and Dr. Edward Leaming.

THE New York *Evening Post* states that the Perrine comet has been observed at the Yale observatory, and an attempt to photograph it was unsuccessful. It was rapidly approaching the sun with slight signs, if any, of a nucleus, appearing as about a star of the fifth magnitude, distinctly visible through an opera glass and almost visible to the naked eye. Since then the brightness of the moon has interfered with

observations, and they will not be resumed for some time.

A CABLE despatch from Naples states that Mount Vesuvius is in a state of eruption. Three distinct torrents of lava are flowing from Atrio del Cavallo, burning chestnut groves along their path and falling into the Vetrana precipice, between Monte Somma and Colline del Salvatore.

MR. HENRY SEEBOHM, the well-known British ornithologist, died in London, November 26th. He was an honorary member of the American Ornithologists' Union.

THE Sixth International Congress of Otology will be held in London, in 1899.

THE First Lord of the English Admiralty does not wish to receive a deputation at the present time on the subject of the renewal of Antarctic exploration under Government auspices; the reason being that all the resources of the Navy are at present required to place the English Fleet in a state of efficiency. Mr. Goschen expresses himself, however, as in sympathy with Antarctic exploration. A meeting of the committee that has been taking the lead in the movement will be held in a few days, and it is possible that they may decide to make an effort to interest the nation so far as to lead to a subscription sufficient to send out an expedition prepared to do two or three years' continuous work.

ACCORDING to *The Lancet* the foundation stone of a Museum of Anatomy and Surgery has been laid in St. Petersburg. The construction of such a museum was suggested by Prof. Ratimof, who is now President of the Pirogoff Chirurgical Society, and it is to be called the Pirogoff Museum. The scheme was well seconded; the Government provided 30,000 roubles towards the purchase and reconstruction of a building to contain the museum, and a sum of 60,000 roubles bequeathed to the Society by the late Countess Musin-Pushkin, to be expended on some memorial to the great Russian surgeon, has been put aside as an endowment of the new museum. The Society has purchased a building, used as a Government store since the time of the Empress Anna, appropriately situated on the banks of the Neva not far from the Army Medical Academy and the large military hospital named after Sir James Wylie. The museum will be arranged on the lines of the Hunter collection in Lincoln's-inn-fields, London, and that of Dupuytren in Paris.

A RECENT return shows that during the year 1894 the cost of alcoholic drink consumed per head in England, Scotland and Ireland was respectively £3 17*s.* 4*d.*, £3 1*s.*, and £2 2*s.* 8*d.*

THE following results of experiments relating to the growth of trees at different times of the day have been sent to *Knowledge* by Mr. E. H. Thompson, the Government entomologist of Tasmania. Measurements were taken as far as possible every three hours, with the following results:

From 6 a. m. to 9 a. m.	.....$8\frac{2}{3}$	per cent. of growth.
" 9 a. m. to noon	.....$1\frac{1}{3}$	" "
" noon to 3 p. m.	.....No growth.	
" 3 p. m. to 6 p. m.	.....	"
" 6 p. m. to 9 p. m.	.....$1\frac{1}{3}$	per cent. of growth.
" 9 p. m. to 12 p. m.	.....$3\frac{7}{8}$	" "
" 12 p. m. to 6 a. m	85	" "

The greatest growths in twenty-four hours were banksia rose, six and a-half inches; geranium, five and three-quarter inches; wattle, four and one-third inches; apple, two and a-quarter inches; pear, one and a-third inches.

ON November 1st a laboratory for study and research was opened in connection with the school of physical and industrial chemistry at 42 Rue Lhormond, Paris. By paying a fixed sum monthly to the city, anyone desiring to work in this laboratory will have all its facilities at his disposal.

THE publishers of *Knowledge* announce that the first colored astronomical plate ever issued in the magazine will appear in the January number. This will take the form of a colored drawing of Jupiter, which has been executed by Mr. N. E. Green, and reproduced by a special process. Amongst the special features for the new year there will be a paper on 'Scientific Geography in England,' by Dr. H. R. Mill, of the Royal Geographical Society, and the following series of illustrated articles: Mr. Vaughan Cornish, M. Sc., on 'Waves;' Mr. Theo. G. Pinches, on 'Akkadian and Babylonian An-

tiquities;' Mr. R. Lydekker, on 'Fur-Bearing Animals;' Mr. H. B. Walters, on 'Greek Art;' Mr. J. Pentland Smith, Mr. Botting Hemsley and other well-known writers, on 'Botany;' and Mr. G. F. Hill, on 'English and Italian Medals and Coins.'

UNIVERSITY AND EDUCATIONAL NEWS.

THE BUILDING FOR PHYSICS AT THE UNIVERSITY OF KANSAS.

FRIDAY, November 22d, a building was dedicated to the work in physics and electrical engineering. This department at the Kansas institution is in charge of Prof. L. I. Blake, who has been attracting attention in late years by his experiments in sea telephoning and fog signalling. That Kansas should devote a building to the study of the most modern and the most interesting of practical sciences is but a sign of the spread of greater interest in knowledge, and the appreciation of the good to be derived from the laboratory. The new building, which has been in process of construction for two years, has been erected at the expense of the State, costing $60,000. The walls are of Berea sandstone, and the inner furnishings of ash. As little iron as possible was used in the construction of the building, the water pipes being of brass and the plumbing fittings of copper. The heating is by the Sturtevant system, all conduit pipes being tiling. An elevator for freight runs the entire height of the building, four stories. At each landing is a room, which is the repair room and workshop for that floor. Leading directly from each of these workshops is a chemical kitchen. The basement floor contains a large general laboratory and four private research rooms. On this floor are the battery room and the room for testing instruments. On the first or main floor are the office of the assistant professor, a small lecture room, the department library and reading room, a general laboratory and two rooms for private research. The second floor includes the office of the head of the department, a small lecture room, two special research rooms, and a large department lecture room. The latter room has an inclined floor, and is fitted with a lecture table provided with all connections necessary for the demonstration of lecture experiments. Adjoining this lecture room and opening into it is the apparatus room, where are kept the various instruments used in the laboratories and for the illustration of lectures. Each room of the building is provided with wires, carrying currents from the dynamos located in the machine shops. All wires enter the building in the basement and are carried to a 'well' which runs from basement to roof, and this 'well' is provided with switchboards at each floor and all wires run in it.

The principal address at the dedication exercises was delivered by Professor Albert A. Michelson, of the department of Physics of the University of Chicago. The subject taken for the address was 'Some Objects and Methods of Physical Research.' After the formal ceremonies of handing the keys to the university authorities, the building was thrown open to the public for inspection.

THE WILLIAM PEPPER LABORATORY OF CLINICAL MEDICINE.

THE Laboratory of Clinical Medicine given to the University of Pennsylvania by Dr. William Pepper, as a memorial to his father was formally opened and presented to the university on December 4th. The presentation was made by Dr. John S. Billings, in the name of Dr. Pepper, who described the building and its purposes.

The building is 62 feet long, 42 feet wide, and four stories high, with a basement cellar; built of brick and terra cotta on a stone base to the first floor, with a green slate roof, and fitted up inside with tables, work benches and apparatus of various kinds. On the first floor above the basement are rooms for microscopical, for chemical and for bacteriological investigations of the secretions, excretions, outgrowths, discharges and other products from the bodies of the sick, with a balance room. On the second floor are rooms for anthropometrical work and research, the laboratory of the Director and his assistant, and a store-room. On the third floor is a large laboratory for post-graduate students, and a dark room for photographers' work. On the fourth floor are a research room for special workers, an assembly room, a library and a janitor's room.

The object of the laboratory is to advance clinical studies by original research, and the publication of results. Only graduate students of an approved medical school are admitted to the laboratory, which is said to be the only separate building devoted entirely to chemical, microscopical and bacteriological reserches and to the post-graduate teaching of clinical laboratory methods. Provost Harrison accepted the gift for the Trustees of the University, and Dr. W. H. Welch, of Johns Hopkins University, delivered an address on scientific and laboratory methods.

Dr. William Pepper will be the first director of the laboratory, and nine associates undertaking original research have already been appointed.

GENERAL.

THE corner stone of the new Library of Columbia College was informally laid on the afternoon of Dec. 7. In the presence of the Trustees and several officers of the College President Low made a few remarks and set the stone in place. The first courses of the white Indian limestone of which the building is to be constructed are now being laid, and the iron work of the interior is finished up to the main floor.

PROF. ARTHUR KENDRICK, assistant professor of physics, Worcester Polytechnic Institute, has resigned to accept an associate professorship in physics in the Rose Polytechnic Institute. Prof. Kendrick was graduated at Amherst College, and after a three years' graduate course in physics in Harvard University, was made assistant professor of the Worcester Polytechnic Institute about three years ago.

THE corner stone of the new building of the Brooklyn Institute of Arts and Sciences on Prospect Hill, opposite Prospect Park, will be laid December 14th, at three o'clock in the afternoon. The New York *Evening Post* states that Mayor Schieren will lay the corner stone, and A. Augustus Healy, President of the Institute, will preside. The principal address will be delivered by the Rev. Dr. Richard S. Storrs, President of the Long Island Historical Society and first Vice-President of the Institute. A poem for the occasion will be read by the Rev. John White Chadwick, and brief addresses will be delivered by St. Clair McKelway, representing the Board of Regents of the State of New York, and Seth Low, President of Columbia College, as representing the educational interest of New York city. The foundations of the building, which are of Milford granite, are already laid, and the walls, which are to be of light gray Indian limestone, are now rising above the ground.

ACCORDING to *The British Medical Journal* a new surgical polyclinic, in connection with the Berlin University, will be opened very shortly. Prof. König, the successor of Dr. Bardeleben, is to be its head, and his assistant, Prof. Hildebrand, who follows him to Berlin from Göttingen, its chief surgeon.

AT a meeting held at the University of London, on November the 21st, Sir James Paget in the chair, and attended by delegates from institutions named in the report of the Royal Commission on the Gresham University, by members of that Commission and of the earlier Commission on 'A Teaching University for London,' and by others interested in the establishment of a teaching University, the following resolution was unanimously passed: "That the Government be requested to introduce, at an early date, a bill, similar to Lord Playfair's London University Commission Bill, 1895, appointing a Statutory Commission to carry out the recommendations of Lord Cowper's Commission, but with an added clause giving to all institutions or persons directly affected by any statute or ordinance proposed by the Statutory Commission a right of appeal to the Privy Council for the disallowance or alteration thereof, previous to such ordinance being laid before Parliament for confirmation."

DAVID H. HOLMES, lately of Johns Hopkins University, and at one time professor of Latin in Allegheny College, has been elected to fill the chair of Latin at the University of Kansas. This position was made vacant by the death of D. H. Robinson, who had occupied it for thirty years.

THOMAS A. JENKINS, PH. D., of Johns Hopkins University, has been put in charge of Romance languages at Vanderbilt University

in place of C. A. Eggert, Ph. D., who resigned at the close of the last session. W. H. Kirk, Ph. D., of Johns Hopkins University, has been elected instructor in Latin in the place of Frank E. Bradshaw, M. A., who died last month.

A NEW school of technology is to be established at Hartford, as a department of Trinity College.

THE University of the State of New York has published a Bulletin on Extension of University Teaching in England and America, by Dr. James E. Russell. In July, 1893, on recommendation of some of the leading members of convocation, the regents appointed Prof. James E. Russell, then of New York but now professor of pedagogy in the University of Colorado, a special commissioner to visit European educational institutions and report on whatever he might find of most importance to educational institutions in New York, and the results of his investigations are embodied in the present report.

DR. B. E. FERNOW has been appointed special lecturer on forests and forestry in the school of economics, political science and history, in the University of Wisconsin. This course of lectures will probably be the first one of the kind to be given in a school of this character. The following may be mentioned among the topics of which Dr. Fernow will treat: The state of natural resources, the nature of the forest and of its products; an idea as to what forests are, how they grow, how their materials enter into human use, the forest influences on climate, water and soil conditions; history and statistics; methods and requirements of forest management; forest yield a financial calculation; principles of forest legislation, with special reference to the United States, including the history of the forestry reform movement.

CORRESPONDENCE.

THE PERCEPTION OF DIRECTION.

THE 'inverted image' discussion in SCIENCE suggests a number of questions that have a bearing on the pertinence and validity of purely physical solutions of the problem under consideration.

Have we a special sense of direction; and if so, to what extent can its indications be trusted without constant supervision and correction by the other senses? Can the range of the lines drawn from particular cones of the retina to the lens be determined by this hypothetical sense of direction to give any accurate notion of their real projections in space? Does the short base line from the cones to the lens remain constant in its indications under the conditions presented in the movements of the eye to secure the best adjustment for distinct vision? Would not any slight variations in this base line, resulting from movements of the eye, give a confused outline of distant objects if there were no other means of correcting the impressions received from them? Without further detail of specific inquiry the whole may be summarized in general terms, can a satisfactory solution of biological problems be obtained by an appeal to purely physical or chemical considerations?

From our present knowledge of physiological processes, it must be admitted that the physical conditions under which the impressions are made on the retina by external objects represent but a single factor in the series of complex biological activities involved in our final interpretation of visual sensations. The mutuality or reciprocity of the special senses in their relations to the cerebrum must be recognized as essential factors in the conclusions arrived at as to the real significance of the impressions received by the peripheral elements of the special sense organs.

The inverted images on the retina are evidently not directly concerned in the judgments we form in regard to the position and characteristics of the external objects that produce them. These peripheral images on the retina are telegraphed, as it were, to the central nerve organs of vision and brought into relation with cerebral activities, in connection with impressions transmitted in like manner from other sense organs to their appropriate nerve centers, and the resulting correlation of these complex interdependent processes are the basis of the judgments we habitually form in regard to the nature and position of objects in the field of vision.

That we have no specific physiological sense

of direction is manifest in the unconscious tendency to curve to the right or left in walking when blindfolded. My experiments with forty-nine young men show (*Nature* XXXII., 293; SCIENCE XV., 14) that this divergence from a right line is not owing to differences in the length, or strength, or dexterity of the legs, the physical factors that suggest a convenient explanation of the phenomena, but to a lack of coördination in the muscles of the legs, arising from the defective supervision of their movements by the senses.

The ability to walk in a given direction and the proper interpretation of the inverted image on the retina are alike determined by the activities of the brain, including the central sense organs, and physical considerations relating solely to the peripheral organs concerned, which take into the account but a single factor in a complex problem, cannot be accepted as furnishing satisfactory explanations of physiological processes.

MANLY MILES.

LANSING, MICH., November 27.

SCIENTIFIC LITERATURE.

Elements of the Mathematical Theory of Electricity and Magnetism. By J. J. THOMSON. Cambridge University Press. New York, Macmillan & Co. 1895. Crown 8°. Pp. vi. 510.

Electricity and Magnetism. A Mathematical Treatise for Advanced Undergraduate Students. By FRANCIS A. NIPHER. St. Louis, John L. Boland Book and Stationery Co. 1895. Crown 8°. Pp. xi. 426.

Prof. J. J. Thomson is well known as the worthy successor to the chair of Maxwell and Lord Rayleigh. He has been hitherto known chiefly for his work in mathematical physics, and latterly for his numerous experimental researches. This book exhibits him in a new light, namely, as a teacher of elementary students, and plainly declares him a master in that domain. The subject of 'Electricity and Magnetism' is one that lends itself readily to applications of many of the most difficult portions of analysis, and it is generally supposed that an exact comprehension of the various essential parts of the theory is only to be attained by those persons who possess a thorough mathematical training. Maxwell's great work is a bugbear to many a student on account of the mathematical difficulties which it undoubtedly contains. How mistaken the idea is that the essentials of the theory cannot be presented to a person of but slight mathematical training, a perusal of this delightful book will show. The reviewer often recalls the words of one of his old professors in college, who was wont to ask the student who had successfully deduced some differential equation to 'translate that into English.' Prof. Thomson's book consists in doing exactly this for the whole theory of Electricity and Magnetism. In this respect it marks almost a new departure in text-books, for while we are familiar with books which, by leaving out difficulties, and by the use of the process known in England as 'Calculus-dodging,' attempt to attain simplicity, we have never before come across a treatment at the same time so full, so clear and exact, of this particular subject. There are, to be sure, two examples of this style of book. If one were asked to name the best English treatise on Thermodynamics he would still have to answer, Maxwell's 'Theory of Heat.' And yet Maxwell's 'Heat' contains very few mathematical symbols. Still if one thoroughly understands the essential principles contained in the book, and has a thorough knowledge of mathematics, he will be well able to write the mathematical treatment for himself. A second example is Maxwell's 'Elementary Treatise on Electricity,' of which we are at once reminded by the present work. Maxwell, however, there treated but a small portion of the subject, principally electrostatics. What Maxwell would have written had he lived to the present day, and treated of Magnetism and the Electromagnetic Field in general, would have probably resembled what Prof. Thomson has given us. This is perhaps a sufficient compliment, but we are tempted to use the trite illustration of the 'flower from the crannied wall,' and say that if one fully comprehended the 'all in all' of this book, he would be possessed of what is worth knowing of the modern theory of electricity, and with the help of a sufficient knowledge of Green's Theorem and the properties of definite integrals he could spin it out into two thick volumes of mathe-

matical treatment. How then has Prof. Thomson managed to strip off the mathematical dress and to present the naked facts? First, by a thorough familiarity with the mathematical treatment which has enabled him to seize the essential, in spite of disguise, and secondly by an unusual gift of exposition. It is only the thorough knowledge of mathematics that enables one to express mathematical truths in plain language. It is a very common opinion that a great talent for research is incompatible with excellence as a teacher. Unfortunately many instances may be cited in support of this proposition, but we contend that it is by no means necessarily true. The same faculties that make one eminent in research should also go to make him successful as a teacher. For either is necessary first enthusiasm, then a thorough acquaintance with the subject, while the teacher needs in addition only the power of saying what he has to say. Given a good style, and something to say, with a wish to teach, and we cannot see what more the teacher needs. Our present author is an example in support of our contention.

Where all is so good it is difficult to select special portions for commendation. We will, however, mention a few matters not usually well treated in elementary books. The parallel treatment of dielectrics and magnetizable bodies is clearly carried out, and the distribution of the energy in the medium, of fundamental importance in the modern theory, is carefully deduced. We are gratified to notice that the author uses in quantitative statements the expression (*unit*) *tubes of force*, rather than the usual *lines of force*. The inappropriateness of denoting the flux of induction in a dynamo by so many *lines* is illustrated by a recent letter to one of the technical journals, in which the writer makes the luminous remark that the dimensions of the unit of induction cannot be as usually and correctly given, because the dimensions of a *line* are the same as of a *length!* It seems to us to be regretted that Prof. Thomson has here, as in his large volume, made use of the term 'Faraday tubes' to denote tubes of electrical induction. Magnetic tubes are certainly as much due to Faraday as electric. The chapters on fields of force are illustrated by numerous diagrams, some of them new. The confusing matter of magnetic force and magnetic induction is made plain, and the uniform magnetization of a sphere and of an ellipsoid worked out. The statement may be noticed that a long ellipsoid tends to place itself along the lines of force in a uniform field, whether magnetic or diamagnetic. It is so frequently stated in text-books that a diamagnetic body tends to set itself across the field that this will surprise many. The setting across usually observed comes from the lack of uniformity in the field, diamagnetic bodies being repelled from stronger to weaker regions. The correct statement was made forty years ago by Lord Kelvin, who stated, however, that the force tending to make diamagnetic bodies set along the field was probably too small to be observed. It has been observed by the present writer, and the method of observing its influence upon the time of swing of an ellipsoid has been suggested as a means of determining the permeability of diamagnetic bodies, and is now being carried out by one of his students, Mr. A. P. Wills.

Prof. Thomson gives a good treatment of electrolysis and of the electromotive force of batteries, but we think that the fact that the electromotive force can be calculated from the chemical work in the manner stated, only when the cell has no temperature coefficient, should not have been omitted. In the chapter on induction the similarity of the system of currents to a mechanical system is well brought out, and a new and very simple model described. It consists of three weights, hung from carriages rolling on three parallel rails, and kept in line by a straight bar passing through swivels on the carriages. The velocities of the outside carriages being independent, the system may be assimilated to two currents. On account of the third mass, the kinetic energy contains a term in the product of the velocities of the outside carriages, and this term gives rise to the phenomena resembling mutual induction. For instance, if one carriage is started the other goes backward, and when both are moving with constant velocities, if one is arrested the other goes faster. The disadvantage of the model comes from its simplicity, in that the coefficients of induction are constant, so that electromagnetic

forces cannot be shown, nor can induction by motion of the circuits without alteration of the currents. This can be made possible by a simple alteration. If the middle weight, instead of rolling on a fixed rail, roll on the bar connecting the two outer carriages, the coefficients of induction will vary with the position of the middle mass, and moving it along its bar while one of the outer masses is moving will cause the other to move, etc. The centrifugal force tending to make the middle mass roll along its bar will represent the magnetic force between the currents.

A number of interesting cases of induction are worked out, including a simple case of 'throttling of an alternating current' and various practical problems connected with transformers. The explanation of Elihu Thomson's interesting repulsion experiments is also simply given. Various electromagnetic measurements are worked out, including several methods of 'determining the ohm.' Finally the effects of dielectric currents are treated, and the motion of the 'Faraday tubes' and of the energy through the field. The case of propagation of plane electromagnetic waves is taken up, and the experiments of Hertz described. All this with the assumption of no more mathematical knowledge than 'an acquaintance with the Elementary principles of the Differential Calculus.' The reviewer was so struck with the absence of integral signs in the book that he counted them, and was surprised to find that there were actually fifty. Of differential equations there were, however, eighty-six. It will be granted, however, that in a book of over five hundred pages this is not too many. To return to the question of how this is done: It is, after all, by stating facts in language which, while avoiding the notation of the calculus, employs its essential concepts. We question somewhat whether this is not putting on an appearance of simplicity that is but apparent. For instance, it seems doubtful whether the expedient of dividing an area up into meshes, multiplying the force by the area of each and adding, is to be preferred to using the term surface integral in the first place. The method of the book may be characterized as that of dealing with phenomena in infinitely small pieces. It only remains to use the language of limits and to integrate in order to have a complete treatment. If the author may be accused of calculus-dodging, however, he has done it so well that he may be forgiven, and the student is bound to be pleased. We can only congratulate those students who have the good fortune to study this subject under the personal guidance of Prof. Thomson, and we predict a large sale for the book.

Of Prof. Nipher's book, a number of the statements already made of Thomson's may be made. In spite, however, of the word 'advanced' in the sub-title of the former, and of the word 'elementary' in that of the latter, it must be admitted that Thomson's contains a good deal more meat. Prof. Nipher states also that his book "is designed for the use of students who have but recently begun to use the processes of the calculus, and it has been an incidental aim of the author to assist the pupil in acquiring possession of the machinery of mathematics. There has been no attempt to avoid any legitimate analytical method because it is not popularly known, but on the other hand there has been an attempt to avoid wasting the time of the reader over puzzles and obscurities which are made difficult and called easy." This attempt has certainly been carried out. The student will not waste his time if he reads this book. It has evidently been written with a view to the needs of the engineering student, who has been almost ignored by Prof. Thomson. It will do this engineering student good to read Prof. Nipher's chapter on electrostatics, and on energy, even if they do not assist him to design dynamos. Here again we have the parallel action of dielectrics and magnetizable bodies clearly brought out, a matter which can hardly be too strongly emphasized. Prof. Nipher recently announced the existence of 'Ohm's Law' for dielectrics as if it were something new, whereas the matter must have been evident to anyone familiar with the geometrical meaning of Laplace's equation, and was, if we mistake not, known to Faraday. Prof. Nipher has also taken the pains to invent the terms perviance, diviance and perviability, to denote the electrostatic analogues to conductance, resistance and conductivity. We trust that this will not go on to all the cases in which similar

quantities occur in mathematical physics. Du Bois, in his book on magnetic circuits, has given a table of six cases. Prof. Nipher's discovery was effusively welcomed by Prof. Silvanus Thomson, but it was amusing to find one of the English technical journals editorially refusing to admit its truth, on the ground that the current from an electrode in the form of a spherical bowl in an infinite conductor would probably not be distributed in like manner to the lines of force from an electrified bowl in air.

After the chapter on electrostatics, of the large number of examples worked out, nearly all are of practical interest. In fact, the principal complaint that we have to make of the book is that it seems written for engineering students. Practically, of course, this is the reverse of a disadvantage. There is a large amount of arithmetic in the book, which again, although repulsive to some in an 'advanced' book, will be very welcome to many. There are a number of excellent figures, some of them quite original, an interesting one being of a surface showing the doubtless dependence of the strength of an alternating current on self-induction and capacity. Although the dynamo and transformer, including the tri-phase system, receive ample treatment, there is, for those who do not find examples enough in the body of the book, a chapter of well selected problems at the end. There is also a chapter on units, in which both systems are treated, although nothing is said about keeping κ and μ in the formulas. The names given the practical units by the American Institute of Electrical Engineers are mentioned. We notice the curious spelling 'culomb,' which seems neither fish, flesh nor fowl. Each of the above books has a good index. In conclusion we may be permitted to express the wish that every student of electrical engineering might learn at least as much theory as is contained in one or the other of these books. We hope that their appearance will not cause anyone to suppose that Maxwell may now be laid on the shelf.

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WINGE ON BRAZILIAN APES.

Mr. Herluf Winge has recently published his fourth paper on the mammals of the province of Minas Geraes, Brazil.* In this quarto of 45 pages the author deals with the Primates as he has already treated the rodents, bats and marsupials. The material on which the present study is based was brought to the Zoölogical Museum in Copenhagen by Lund and Reinhardt.

As in the earlier numbers of the series, this paper consists of three parts: (1) nominal lists of the species; (2) a detailed enumeration of the species, with critical notes on the relationships of the forms whose remains are found in the cave deposits ('Jordfundne'), and those now living ('Nulevende') in the immediate vicinity of the caves; (3) a review of the mutual relationships of the members of the group.

The paper is illustrated by two plates reproduced from photographs of actual specimens. While the results attained by this process are not as uniform as could be desired, the figures on the whole are satisfactory, especially those of the skull of *Callithrix*.

Five species of apes are represented in the collections, *Callithrix personata*, *Mycetes seniculus*, *Hapale penicillata*, *Cebus fatuellus* and *Eriodes brasiliensis* (*Eriodes 'propithecus'* Winge). Four of these are found both in the cave deposits and living in the vicinity of the caves. Except in the case of *Callithrix personata* the cave bones agree perfectly with those of recent specimens. The single femur of *Callithrix* found in the Lapa da Serra das Abelhas is slightly larger than that of living examples and has the ridges for muscular attachment rather more sharply defined, but is not specifically distinct from *C. personata*. The only extinct species is *Eriodes brasiliensis* (Lund), the living representatives of which occur in extreme southern Brazil.

Mr. Winge applies the new specific name *propithecus* to *Eriodes brasiliensis* because the other species of the genus are also Brazilian, and because the term *propithecus* originally proposed by Lund as the generic name for a group now considered congeneric with *Eriodes* should

* *Jordfundne og nulevende Aber (Primates) fra Lagoa Santa, Minas Geraes, Brasilien.* Med Udsigt over Abernes indbyrdes Slægtskab. Af Herluf Winge. Aftryk af 'E Museo Lundii,' en Samling af Afhandlinger om de i Brasiliens Knoglehuler af Professor Dr. P. W. Lund udgravede Dyre- og Menneskeknogler. Paa Carlsbergfondets Bekostning udgivet ved Professor Dr. C. F. Lütken. Kjöbenhavn, 1895.

not be allowed to disappear from nomenclature.* Fortunately very few systematic zoölogists thus disregard the law of priority.

The last and most general part (pages 9 to 32) begins with a detailed enumeration of the changes that take place in the body during the evolution of the apes from ancestors with bodies in the normal, horizontal position, and in which progression took place by ordinary running and jumping. Mr. Winge's account of the development of the limbs is substantially as follows: The *Primates* were originally raised above the level of the *Insectivora* through special improvement in climbing. Even in the most arboreal of the *Insectivora* (the *Cladobatidæ*) progression is rather by running and jumping among the branches than by true climbing. The apes, however, climb very differently. The hands and feet seize and hold fast to the branches, and the limbs, especially the arms, lift the body and draw it forward. The fingers and toes clutch the branches and in this way take upon themselves the work formerly done by the claws. Since the claws serve no longer as hooks for clinging, they degenerate and become more like nails fitting the shape of the terminal phalanges which on their part are squeezed flat by the pressure of the fingers and toes upon the branches. To improve the grasping power of the hand and foot, the thumb and great toe stand out from the other digits and become opposable to them. At the same time the thumb and great toe increase in size and strength, while the positions of their articulations, as well as the form of the bones to which they are attached, are necessarily altered. As a result of efforts to accomplish a variety of movements in all directions, the limbs become more independent. The thigh and upper arm are held less closely to the sides and are no longer bound by a covering of the body skin. As the limbs become more free the muscles which work them undergo modifications. In the arms the *supraspinatus*, *infraspinatus* and *subscapularis* increase in strength and produce great changes in the form of the shoulder blade. The *deltoideus* shows its increased power by causing the clavicle to grow heavier. Of the muscles which work the legs the *glutæi* and *iliacus internus* produce the most noticeable changes in the bones to which they are attached. Since the fore limbs are little used as supports for the body, the shoulder blades lose the nearly perpendicular position which they occupy as a mechanical necessity in most terrestrial mammals. To permit freer motion of the limbs the joints either retain the structure characteristic of the Insectivora or become even more loose, especially in the arm, hand, fingers and toes. At the same time the radius and ulna become mutually more free, while the latter loses its connection with the wrist. The metacarpals degenerate somewhat, becoming at length small and flat, their articulations with the proximal phalanges taking on a form which approaches the ball and socket joint. The two small sesamoid bones under each metacarpal degenerate, and the ridges on the latter on each side of which the sesamoids play disappear. The more varied the motions of a limb, the less strength exerted in each movement. The muscles of the limb become, therefore, more evenly developed, none of them increase at the expense of the others, and the bones do not give off strongly projecting ridges. Two of the movements which in most animals are performed oftenest and with most strength, the simple flexion of the elbow and ankle, are now less frequent. Hence the *triceps* and *gastrocnemius* have less influence over the other muscles, while the *processus anconeus* and the *calcaneum* have a tendency to become weaker. In the primates, entirely contrary to what occurs in ordinary running and springing animals, the arms become of more importance than the legs, because in true climbing the former are used most. The lengthening arms force the body to take on a more and more upright position during progression, so that when the arms have become very long, walking on all four feet is so difficult that it is entirely abandoned, and the body is at length held in equilibrium over the hind limbs.

*"*Propithecus* kan ikke opretholdes som egen Slægt; den falder sammen med *Eriodes*. Strengt taget skulde Arten fra Lagoa Santa derefter kaldes *Eriodes brasiliensis*, et Navn, der dog vilde være for intetsigende; ogsaa Slægtens andre Former kjendes fra Brasilien. Det er foretrukket at give Arten et 'nyt' Navn, *Eriodes propithecus;* Ordet *Propithecus* fortjener ikke at forsvinde." No. 2, p. 24.

After enumerating in a similar manner the changes that occur in other parts of the body, especially in the vertebræ, brain and mouth, the author gives a detailed study of the inter-relationships of the different groups of monkeys and lemurs. Space will not permit an analysis of this part of the work, but the following table of supergeneric groups (p. 12), arranged according to their greater or less resemblance to the *Insectivora*, gives a concise synopsis of the conclusions reached by Mr. Winge.

Lemuroidei.
- Tarsiidæ.
  - Adapini.
  - Tarsiini.
- Lemuridæ.
  - Nycticebini.
    - Otolicini.
    - Nycticebi.
  - Lemurini.
    - Lemures.
    - Propitheci.

Ceboidei.
- Cebidæ.
  - Mycetini.
    - Callitriches.
    - Pitheciæ.
    - Mycetæ.
  - Hapalini.
  - Cebini.
    - Cebi.
    - Ateles.
- Simiidæ.
  - Simiini.
    - Hylobatæ.
    - Homines.
    - Simiæ.
  - Cercopithecini.
    - Cercopitheci.
    - Cynocephali.

GERRIT S. MILLER, JR.

Palæozoic Fossils (Vol. 3, Part II.). By J. E. WHITEAVES. Geological Survey of Canada. Ottawa. 1895.

This publication contains two papers: (1) Revision of the fauna of the Guelph formation of Ontario, with descriptions of a few new species, and (2) Systematic list, with references, of the fossils of the Hudson River or Cincinnati formation at Stony Mountain, Manitoba. In the first paper 130 species and varieties are enumerated, and it may be considered as a complete list of the fossils so far known from the Guelph of Canada. The new species described are *Monomerella durhamensis*, *Pleurotomaria velaris*, *P. halei* var., *P. townsendii*, *Loxonema magnum* var., *Polytropis durhamensis*, *P. parvulus* and *Illænus aboynensis*.

The second paper dealing with fossils from Stony Mountain is interesting as a systematic list of all the fossils from this lonely outlier of the Cincinnati group of the Lower Silurian. The rocks are said to be 'identical, both in their lithological and paleontological characters, with the well-known rocks of the Hudson River or Cincinnati group of southern Ohio and elsewhere.' If this be the case it is interesting to note the presence here of a species of *Favasites* (*F. prolificus*, perhaps only a variety of *F. gothlandicus*) well known as a Niagara fossil in Ohio, but not yet found in the true Cincinnati rocks. Most of the others are well-known fossils occurring in Ohio, although appearing under names not given in the older volumes on Paleontology of New York or Ohio. The plates in the pamphlet, seven in all, are beautifully lithographed. J. F. J.

Contributions to a Biography of Linnæus. By TH. M. FRIES.

Prof. Th. M. Fries, of Upsala, Sweden, has for a number of years been engaged in a critical study of the life of Linnæus, and the first instalment of his forthcoming work was some time ago published in the University Annual. The paper treats of the early life of the great naturalist up to the time of his entering the University of Upsala at the age of twenty-one.

The author is clearing away some of the fictions with which the earlier biographers have sometimes adorned their accounts of the career of the 'Flower King.'

While it is true that Linnæus did not come of a distinguished line of ancestors, the author shows that he was no exception to the laws of descent and of inheritance of mental traits, as some have made it out. His male ancestors on his mother's side belonged to the clergy and had for three generations been rectors in the same parish, and his lineage on his father's side extends into the best peasantry of Småland. It is also noted that both of his parents took much interest in gardening and in the culture of flowers. With the relatives of his father, the author says, this seems to have been an often recurring trait. An uncle of Linnæus' father,

while in the employ of the Count von Horn, of Germany, as private chaplain, devoted himself with great zeal to the study of horticulture, and laid out a garden for his master according to the requirements of the art of gardening at that time. Later on when this gentleman had returned to Sweden he planted a garden, in which were grown a number of species not previously cultivated in his native country. It was among these plants that Carl's father, Nils Linnæus, acquired a lasting interest in gardening, and several years afterwards, while a student at the University of Lund, he busied himself learning the Latin names of various kinds of plants, and 'put up with his own hand' an *herbarium vivum* of fifty plants. This was somewhat unusual for a student at that time. While rector at Stenbrohult Nils Linnæus in his turn had a garden, which surpassed everything before seen in that part of the country, and in which were found several hundred exotic, mostly ornamental, plants.

All of Linnæus' biographers tell of his early fascination for the beauties of flowers. We have heard the story of his own little plantation, maintained in a corner by itself and duplicating most things grown about the parsonage. We are informed that at the age of four his curiosity prompted him to make inquiries of his parents for the names and properties of different plants and to go out into the fields and meadows to look for flowers. It is well known that the predilections of the child early matured into the earnest inquiries of the student and the investigator. On this point there have been no opportunities for fiction or exaggeration. Not so with some other features of his earlier life. He has by some been represented as a stupid scholar in everything not pertaining to natural history. On this point Prof. Fries brings forth evidence that such was not the case.

The records of the gymnasium show that Carl Linnæus was regularly promoted, from year to year, through the several classes of the preparatory school and that he was in due time promoted to the Wexio gymnasium at the age of seventeen, ranking eleventh in a class of eighteen members. The author admits that Linnæus neglected the studies of theology, Hebrew, composition and philosophy (logic), which subjects were then regarded as the most important ones, as nearly all of the students were supposed to prepare for the clerical profession or to take up, later on, an administrative career. In mathematics and in physics Linnæus was always among the best students in the class. In the Latin language he was quite proficient, even for the times he lived in, as is evident from the ease with which he used this language in his writings.

Prof. Fries throws some new light on one circumstance which has been quite generally misunderstood. The teachers at Wexio have been made the objects of much unjust censure from Linnæus' biographers for having advised his father to take the young man out of school and have him learn some trade. Even Linnæus himself in his older days of failing memory refers to the advice of these men in a piquant manner. But it is quite probable that this advice was given in the way of emphasizing their disapproval of the young man's neglect of some of his studies. Considered from this point of view, it was quite natural and proper for the teachers to give such advice to the parent of a son, who had slighted several of the subjects regarded as of the greatest importance for his future. The same course would no doubt be taken by the teachers in our own schools of to-day. The ridicule and the criticisms of these men have evidently been prompted by a desire to give a brighter lustre to a great name.

In a similar way it has been represented that on his departure for the University of Lund Linnæus was not properly recommended by the rector of Wexio gymnasium in this gentleman's letter of dismissal. But it is pointed out that this letter itself must silence such representations. The rector wrote: "As nature in the vegetable kingdom offers pleasant spectacles when she hastens and favors the growth of the plants as they are removed to a new place, so the muses pleasantly exercise their power when bidding young men with great talents take up their studies at another place. * * With this purpose the muses now call * * Carl Linnæus, a particularly excellent young man, of a good family, etc., from our gymnasium to the University." Then follow the usual good wishes for the future welfare of the scholar. The rector in this let-

ter evidently betrays an appreciation of Linnæus' character and ability and his words indicate that he had some expectations as to the future career of his pupil.

The further treatment of the later life and work of the great naturalist will be awaited with interest. The author remarks that no biography of Linnæus can do him justice, unless it be written on the basis of a thorough knowledge of all the sciences to the development of which he gave his attention. It is only by comparison of these sciences, in the condition in which they were before his time and in the state to which they were brought by his efforts as an investigator and by the powerful impetus of his teaching, that we can truly appreciate the greatness of his work and see its influences extending into our own time. In this age of specialization there is perhaps no one man who has such a wide knowledge of these branches as would be required; and a full account of Linnæus as a man of science would require the coöperation of several men interested in the different departments of natural history.

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SCIENTIFIC JOURNALS.

PHYSICAL REVIEW, VOL. III, NO. 3, NOVEMBER-DECEMBER, '95.

Variation in Electrical Conductivity of Metallic Wires in Different Dielectrics. By Fernando Sanford.

In a paper published in 1892 Prof. Sanford presented the results of observations on the resistance of copper wires when immersed in different dielectrics, and reached the conclusion that the conductivity was to some extent dependent upon the nature of the dielectric, quite apart from incidental temperature changes, leakage, etc. The change observed in the resistance was small, amounting to not more than 0.2%. Since that time similar measurements have been undertaken by at least one other observer in the hope of verifying Prof. Sanford's conclusions, but without success. The original papers have in fact been quite generally and severely criticised.

In the present paper Prof. Sanford discusses the sources of error which have been suggested as accounting for his results, and calls attention to the fact that his conclusions have recently been qualitatively verified by Grimaldi and Catania with more accurate apparatus than he had himself used. The paper also contains the results of further observations on copper and silver wires. The amount of the resistance change was found to differ greatly with different samples of wire; but the direction of the change was always the same for a given material. Thus the resistance of copper was less in petroleum than in air, while with silver the resistance was found to be less in air. Strangely enough the behavior of a silver wire which had been copper-plated was almost identical with that of pure silver. The results obtained are certainly difficult of explanation, but are the more interesting on that account.

A Study of the Polarization of the Light Emitted by Incandescent Solid and Liquid Surfaces. II. By R. A. Millikan.

The first half of this paper, dealing with the qualitative study of polarization by emission, has already been noticed in Science. In the present article the subject is treated quantitatively. The substances investigated were platinum, silver, gold and iron, the first two mentioned proving most satisfactory.

By means of a simple but accurate polarimeter the amount of polarization was measured at different angles of emergence. The results were then compared with the values given by Cauchy's theory of metallic reflection, upon the assumption that the polarization is due to the refraction of the rays from the interior on emerging from the surface. The agreement between the computed and observed values is quite striking, and makes it appear that refraction at emergence offers a satisfactory explanation of the phenomena in all the cases investigated. The agreement is especially good in the case of molten silver.

Observations upon the light developed by fluorescence at the surface of Uranium glass show that the light is polarized much in the same way as the rays from an incandescent surface. Here, too, the effect may be explained as a result

of refraction, and the values computed from Fresnel's theory of vitreous reflection and refraction are in close agreement with the observed amounts of polarization.

On Ternary Mixtures III. By W. D. BANCROFT.

The present article, which completes a series of three papers on this subject, deals with liquid mixtures in which two components are partially miscible, while the third is miscible with these in all proportions. The 'Mass Law' is found to hold in this case as well as in the case discussed in the previous articles. In support of his conclusions the author presents not only his own observations, but also the numerous results previously obtained by other observers. It is found that in general there are *four* sets of equilibria. Dr. Bancroft discusses also the question of the distinction between the solvent and a dissolvent substance, and is of the opinion that there is a fundamental difference between the two.

On the Changes in Length Produced in Iron Wire by Magnetization. By L. T. MOORE.

After a brief review of the work previously done on this subject the author describes experiments to determine the elongation of soft iron wire as a function of the magnetization. The apparatus used had a multiplying power of 37,000 and permitted the use of a field as high as 260. Precautions were taken to obtain uniform magnetization, and the latter was directly measured. It was therefore possible to plot the elongation in terms of the magnetization, rather than in terms of the field, as has usually been done heretofore. After correcting for the contraction due to the magnetic force between adjacent parts of the iron, the maximum elongation was found to occur at an intensity of magnetization of about 1,200. Beyond this point the elongation diminished. The effect of hardening was investigated, and measurements were also made when the wire was subjected to tension.

The number contains minor articles on the Limits of Pitch for the Human Voice, by W. Le Conte Stevens; and the New Physics Laboratory at Lille, by E. L. Nichols.

Book reviews: Hertz, Electric Waves; Glazebrook, Mechanics.

AMERICAN METEOROLOGICAL JOURNAL

DECEMBER.

Meteorology as a University Course. By ROBERT DEC. WARD.

The science of meteorology has been largely built up by Americans, as the names of Franklin, Redfield, Espy, Maury, Coffin, Henry, Ferrel and Loomis—known all over the world—show, and yet the study of the subject in this country is by no means as general or as systematic as it should be. The author pleads for more instruction in *general* meteorology, and advises the consideration of the various subjects in the following order: Evolution, composition and offices of the atmosphere and its relations to plants and animals; relations of earth and sun; the variations of the seasons and the distribution of temperature over the earth's surface for the year, January and July, together with a study of isanomalous and of equal annual range charts; the distribution of pressure for the year, January and July, and the resulting winds; classification of the winds; moisture of the atmosphere and precipitation; storms, including cyclones, thunderstorms and tornadoes; distribution of rainfall over the world, by seasons and for the year; weather; climate, including sanitary climatology, secular changes in climate and the relation of climate to history.

Abundant and attractive illustrations may easily be secured for such a course, as, *e. g.*, the daily weather maps, barograph and thermograph curves; temperature, pressure, wind, cloud and rainfall charts; photographs of clouds, lightning, snow crystals, damage by tornadoes, etc.

A large field of investigation is open to those who have completed a course in general meteorology, and yet who have not advanced far into physics or mathematics. Among the lines of work suggested are the following: The careful study of the climates of the different States, the effects of their topography on their rainfall, their winds and the courses of their local storms; the local effects of forests and of cultivation on rainfall; the distribution of rainfall by seasons, months and districts, and its bearing upon the times of planting and harvesting; the changes in the depth of the ground-water level, and its variations with the weather and with the season.

THE PSYCHOLOGICAL REVIEW, SEPTEMBER, 1895.

Some Observations on the Anomalies of Self-Consciousness (1): JOSIAH ROYCE. In this paper the author traces the development of the idea of self in the child, emphasizing the social influences which contribute to it, as worked out in earlier papers by himself and by Baldwin. He then attempts to account for the various disturbances of self-consciousness which are known to the students of mental pathology—and for the very large part which organic, visceral, and conæsthetic sensations play in these disturbances—by derangements of the associations between the social factors in the environment and these organic bodily processes, as such associations have become established in the process of learning. Organic disturbances are therefore among the most common causes of perturbances of the sense of self, since they suggest distorted and mistaken social situations; and the reverse is true: social disturbances may bring about distorted states of the common sensibility and so work changes in the sense of self.

On Dreaming of the Dead: HAVELOCK ELLIS. This is an account of the forms which dreams about the dead take on, with actual instances reported. It suggests lines of analogy between such dreams and processes in the early history of mankind of which anthropological theory has taken notice.

Emotion, Desire and Interest (Descriptive): S. F. MCLENNAN. An analytical study of the relation of emotion, desire, and interest to one another.

Reaction-Time According to Race: R. MEADE BACHE. In this paper Mr. Bache attempts to bring to an experimental test the theory that advance in culture and in the deliberative processes characteristic of advanced stages of civilization tends to break up the reflex processes and lengthen them. With the help of Prof. Witmer, of the University of Pennsylvania, a research was carried out upon the reaction times of ten individuals each of three races—Indians, Negroes and Whites. He found the Whites giving the longest reaction-time, as the hypothesis required, the Negroes coming next and the Indians being quickest. The relation between the Negro and the Indian he accounts for on the theory that the former has been made less quick by his ancestry of slavery, and the Indian more quick by his method of life.

Discussion. Pain-Nerves: H. NICHOLS. A review of Prof. Strong's paper in the July number of the same Review. *Professor Watson on Reality and Time:* J. MARK BALDWIN. A review of a paper by the author mentioned in the title. *Psychological Literature, Notes, &c.*

NOVEMBER, 1895.

The Confusion of Function and Content in Mental Analysis: D. S. MILLER. This paper points out the danger and the currency of such confusion, holding that the difficulties attending certain problems which he enumerates are mainly due to it. He holds that the function of a mental content must have recognition by psychology as a matter of process, the ordinary conceptions of processes and activities getting a construction under this term 'function.' Incidentally to the main discussion there is an interesting note on Belief.

The Origin of a 'Thing' and its Nature: J. MARK BALDWIN. This paper is a long discussion of the problem as to how far the theory of the origin or natural history of a thing can give an adequate statement of its nature and value in the system of the world. It aims to bring to the bar the claim of the evolution theory that it explains things by describing their history in a developing series. The author propounds a distinction between the 'retrospective' and the 'prospective' points of view, claiming that the evolutionist takes exclusively the former; but since all growing, developing things are never exhausted at any stage to which their career has already attained, more career is always to be expected. This expectation of more career, of further development, supplies the 'prospective' reference of reality; and the habit of mind which looks forward rests on the same kind of experience of nature that the historical or evolution habit of mind does. And since all reality is an organized system, whose career is never finished in our experience, we must think also prospectively. Under this head the author brings the older conceptions of teleology, intuition, ethical values, the activity of volition, etc., *i. e.*, they are all illustrations of thinking in the 'prospective reference.'

Systems of philosophy are criticised from the point of view gained from this distinction. Finally these two habits of thought are connected respectively with the two principles of organic and mental development called Habit and Accommodation in the author's recent work on 'Mental Development.'

Some Observations of the Anomalies of Self-Consciousness (11): JOSIAH ROYCE. The conclusion of the paper with the same title in the September number. A case is given from the author's acquaintanceship illustrating the general principles laid down in the earlier paper.

The Perception of two Points not the Space-Threshold: GUY TAWNEY. A re-examination of the sensibility of the skin to differences of position when two points are touched at slight distances apart. A variety of semi-spacial distinctions are discovered when the two compass points are nearer than can be clearly distinguished; and the writer takes these vague judgments of size, direction, etc., to indicate that the distance just felt as two stimulations is not really the 'threshold' for space perception, as is generally supposed; but that there are indications of a confused 'extensity' sensation in connection with all touch stimulations.

Discussion. Physical Pain: H. R. MARSHALL. A reply to the article by Prof. Strong in the July number. *A Case of Subjective Pain:* J. H. CLAIBORNE. This note relates a case of 'a wave of pain' felt 'after an operation on the eye' simply when the absence of a friend was thought of, the pain being succeeded by pleasure when the friend was thought to be present again. *Psychological Literature, Notes, &c.*

BOTANICAL GAZETTE, SEPTEMBER.*

THE body of this issue is devoted to reporting the proceedings of the Botanical Society of America, the Botanical Section (G) of the American Association for the Advancement of Science and the Botanical Club of the A. A. A. S. The address of Dr. J. C. Arthur, as vice-president of section G, is printed in full; subject, *Vegetable Physioloyy.*

In the department of *Noteworthy Anatomical and Physiological Researches* Borge's 'Ueber die Rhizoidenbildung bei einigen fadenformigen Chlorophyceen' is abstracted by Miss Stoneman, and Meyer's 'Untersuchungen über Bakterien' by Dr. Russell.

In *Briefer Articles* Frank M. Andrews describes the development of the embryo sac of *Jeffersonia diphylla*, and Lyster H. Dewey describes a new species of *Laphamia* (*L. ciliata*) from Arizona. The *Editorial* pages are devoted to a discussion of the nomenclature question apropos of the action of the Botanical Club. In *Open Letters* Mr. F. V. Coville replies to Dr. Robinson's objections in the August number to the reformed nomenclature, and Mr. C. F. Millspaugh writes against decapitalization of specific names. Three pages of *Notes and News* close the number.

BOTANICAL GAZETTE, OCTOBER.*

New or Peculiar Aquatic Fungi, I.: ROLAND THAXTER. This is the first of a series of four papers, and deals with the genus *Monoblepharis*, of which the writer recognizes four species in this country, *M. polymorpha* Cornu, 'a second form related both to this species and *M. sphærica*,' and two new species, *M. insignis* and *M. fasciculata.* The life history of the new forms is given, together with a description of the two last named, illustrated by a lithographic plate.

The Regulatory Formation of Mechanical Tissue: F. C. NEWCOMBE. Prof. Newcombe shows in this paper how the mechanical theory of growth, as determined by hydrostatic pressure within the cell and by the resistance of the cortex, gradually grew up; points out the fact that these, its two most vital supports, have been shown to be mere assumptions; and shows that growth, and especially the formation of mechanical tissues, is self regulated and is a phenomenon of irritability, a genuine reaction to strains.

Synopsis of North American Amaranthaceæ, IV.: EDWIN B. ULINE and WM. L. BRAY. The genus *Alternanthera* is treated in this installment. Eight species are recognized. *A. Kerberi*, from Mexico, is described as new.

In the department of *Noteworthy Anatomical and Physiological Researches* Mr. G. H. Hicks gives a résumé of Massart's 'La biologie de la végétation sur le littoral Belge;' Prof. Mac-

* Issued September 25, 1895. 48 pp., 1 pl.

* Issued October 17, 1895. 40 pp., 1 pl.

Dougal gives a brief account of Meyer's recent volume, 'Wesen und Lebensgeschichte der Stärkekörner der höherer Pflanzen;' and Mr. Theo. Holm abstracts Bonnier's paper, 'Les plantes arctiques comparées aux mêmes espèces des Alpes et des Pyrénées.'

In *Briefer Articles* Thomas Meehan discusses the derivation of Linnæan specific names; Bessie L. Putnam describes three instances of day blooming in *Cereus grandiflorus* on account of retardation by cold weather; J. B. S. Norton reports for the first time the occurrence on Indian corn of *Ustilago Reiliana*, which was discovered in this country a few years ago on sorghum; and A. S. Hitchcock describes the cultivation of *Buchloe dactyloides* (buffalo grass) to determine the question of the arrangement of its inflorescence. The *Editorial* deals with the decline in interest in the A. A. A. S. shown in the Springfield meeting and the best methods of increasing the interest again. In *Current Literature* there is a review of the second edition of Mrs. Dana's 'How to Know the Wild Flowers.' In *Open Letters* Prof. Kellerman continues the discussion on nomenclature. *Notes and News.*

BOTANICAL GAZETTE, NOVEMBER.*

Recording Apparatus for the Study of Transpiration of Plants: Albert F. Woods. Mr. Woods has adapted Marvin's recording rain gauge, with the assistance of Prof. Marvin, to recording continuously the weight of a plant which is losing water by evaporation. In this paper he describes and figures the apparatus and its records.

New or Peculiar Aquatic Fungi, II.: Roland Thaxter. In this second paper Dr. Thaxter deals with the genera *Gonapodya* and *Myriobleph-aris*. To the former he refers *Saprolegnia siliquæformis* of Reinsch, and a new species which he calls *G. polymorpha*. *Myrioblepharis* is a new genus with a single species, *M. paradoxa*. Not only descriptions but life histories of these plants are given, accompanied by a handsome plate.

Observations on the Development of Uncinula spiralis: B. T. Galloway. Knowledge of how this fungus passes the winter and infects its host, the grape, in the spring has been wanting heretofore, and the investigations of Mr. Galloway were directed to these points. The development in the course of the winter and the mode of germination of the ascospores he succeeded in ascertaining, but was unable to infect grape leaves artificially. Two plates illustrate the paper.

Notes from my Herbarium, IV.: Walter Deane. In this installment Mr. Deane describes his 'baby flower press' and the manner in which he secures ephemeral and delicate flowers in good condition for the herbarium, and shows its usefulness for preserving partially dissected parts.

Noteworthy Anatomical and Physiological Researches. Theo. Holm contributes a notice of Andreae's 'Ueber abnorme Wurzelanschwellungen bei *Ailanthus glandulosus*,' and of several papers upon galls. Professor MacDougal writes an account of Czapek's 'Ueber Zusammenwirkung von Heliotropismus und Geotropismus.'

In *Briefer Articles* L. H. Dewey shows, with the aid of a map, the distribution of the Russian Thistle in the United States, up to October 30, 1895. Margaret F. Boynton describes some observations on the distances to which seeds are thrown or wafted by the wind; and T. D. A. Cockerell writes of Western weeds and some alien weeds in the West. In *Current Literature* there are reviews of the 'Kew Index,' just completed, the new fascicle of Gray's 'Synoptical Flora of North America,' the eleventh volume of Saccardo's 'Sylloge Fungorum,' the fourth volume of Massee's 'British Fungus-flora,' together with notices of several other smaller works. In *Open Letters* the nomenclature discussion continues, with a contribution on homonyms by J. H. Barnhart, and F. A. Bather takes Mr. Millspaugh to task for some classical heresies anent decapitalization.

*Issued November 17, 1895. 40 pp. 4 pl.

ACADEMIES AND SOCIETIES.

NATIONAL GEOGRAPHIC SOCIETY, FOURTH MEETING OF THE FRIDAY EVENING COURSE, WASHINGTON, FRIDAY, NOV. 22, 1895.

Mr. E. L. Corthell, the well known civil engineer of New York, delivered an illustrated lecture on the Tehuantepec route and its suitability for an inter-oceanic canal.

Mr. Corthell spoke of the efforts which have been made for centuries to find a passageway between North and South America, leading into the Pacific Ocean. Cortez was struck with the small obstacle to crossing the isthmus which he found at Tehuantepec, and obtained a grant of land where he thought the route of commerce would eventually lie. These are the very lands upon which the Tehuantepec Railroad has been built, and they are still held by Cortez's descendants.

The climatic and nautical conditions of Tehuantepec are favorable, and the country is healthful and approachable for sailing as well as steam vessels. The terminus on the Atlantic side is very near to the United States, while on the west it is naturally protected by rocky headlands. One of the most important geographical facts connected with this question is shown by drawing the shortest great circle between Panama and Yokohama. This line passes east of San Francisco, showing that all commerce by way of Panama, not only for San Francisco, but for China and Japan, must pass directly by the terminus of the Tehuantepec Railroad. A comparison will show that the Tehuantepec route has an advantage over all others of an aggregate of over 125,000 miles.

'ALASKA and Her Boundary' was the subject of an address delivered before the National Geographic Society in the Cosmas Club hall, at Washington, on the evening of November 29th, by Mr. Marcus Baker, of Washington.

By means of Canadian, American and English maps the situation of that part of Alaska's boundary line which is now receiving so much attention in the newspapers, in interviews, in Congress and by three governments was made clear. The eastern boundary of Alaska was first laid down by the convention between Great Britain and Russia in 1825. The speaker traced the history of the region in question from its first discovery by Bering in 1725 down to the convention of 1825, pointing out the three great steps of geographic progress during that century. First, the map published by the St. Petersburg Academy as the result of Bering's second expedition; second, the map resulting from Cook's explorations of 1778, and lastly, the maps resulting from Vancouver's work in 1792–4. Mr. Baker discussed the history of these maps and pointed out their merits and demerits, dwelling on the map of Vancouver, which, he said, was remarkable for accuracy and trustworthiness.

When the Russian and English diplomatists, said Mr. Baker, agreed upon and described what is now Alaska's eastern boundary line, all the interior of Alaska was a blank on the maps. Whether Alaska and Greenland were united or separated, no man knew, and the boundary line passed almost absolutely through territory unvisited by white men. The southeastern part of Alaska may conveniently be called the Pan Handle. On Vancouver's map, which was used by the diplomatists, a well-defined range of mountains is shown, stretching in a general way parallel to the continental shore. The diplomatists took this range of mountains for the boundary, but provided that in case this supposed range should extend more than 35 miles inland, then the boundary should be a line parallel to the winding of the coast and 10 marine leagues, equivalent to 35 miles, therefrom.

The Alaskan boundary question resolves itself therefore into this: The supposed mountain range does not exist. It is therefore needful to fall back upon the alternative line, that is, a line parallel to the winding of the coast, and, further, it is necessary to determine what, within the meaning of the treaty, constitutes a coast line. Is the line to follow the high-water mark of salt water, or is it to be carried from headland across narrow inlets? This is one of the questions to be adjudicated.

As to the extreme southern part of the Pan Handle, Gen. R. D. Cameron, of British Columbia, some years ago in an official document gave a novel and startling interpretation of the treaty. It was clearly provided in the treaty that the boundary line should start from the southernmost part of Prince of Wales Island, and proceed northward up Portland Canal. General Cameron, finding that it was necessary to go some distance east along the parallel of 54° 40′ to reach the mouth of Portland Canal, said the words 'Portland Canal' are palpably erroneous. Let us therefore omit them and

carry it northward up Behm Canal. The effect of this change is the transfer from American to British territory of an area about equal to that of the State of Connecticut, an area within which stands a custom house of the United States, within which formally was a military post of the United States, and within which is a large island which by act of Congress four years ago was set apart as a reservation for a tribe of Indians that left British Columbian territory for the purpose of acquiring a residence on American territory. As to submitting to arbitration the question of domination over this particular part of southeastern Alaska, the speaker declared it would be unwise, unpatriotic, and unjust to our Indian wards. He declared that the only arbitration in such a case was the arbitration of battle.

Mr. Baker's paper will doubtless be published in the National Geographic Magazine.

The meeting closed with brief remarks by Dr. W. H. Dall, of the Geological Survey, who was one of the commissioners on the part of the United States to discuss the boundary question and kindred questions with Canada, in 1887 and 1888, and by General A. W. Greely, United States Army."

W. F. Morsell.

SCIENTIFIC ASSOCIATION OF THE JOHNS HOPKINS UNIVERSITY.

One hundred and twenty-second regular meeting, November 17, 1895. President Remsen in the chair.

After a few remarks by the President the following papers were presented and read:

1. *The Discovery and the Properties of Helium.* By J. S. Ames and W. W. Randall.

Dr. Randall told the story of the discovery of Helium and discussed its properties from the chemist's point of view. He was followed by Dr. Ames, who confined himself to the properties of the spectrum of the gas. At the end of the meeting an opportunity was afforded those present to view the Helium spectra; the gas being in tubes brought from London by Dr. Randall.

2. *The Solution and Diffusion of Metals in Mercury.* By W. J. Humphreys.

Mr. Humphreys gave the results of a number of experiments on the rate and amount of solution and diffusion of various metals in mercury. Diagrams were exhibited showing the results of the investigation.

The following papers of research were then presented and read by title:

1. *Geometrical Multiplication of Surfaces:* By A. S. Chessin. (Annals of Mathematics.)
2. *On Cauchy's Numbers:* By A. S. Chessin. (Annals of Mathematics.)
3. *On Divergent Series:* By A. S. Chessin. (Bull. Am. Math. Soc.)
4. *On a point of the Theory of Functions:* By A. S. Chessin. (Am. Journal of Math.)
5. *Demonstration of the Existence of a Limit for Regular Sequences of Numbers:* By A. S. Chessin. (University Circulars, J. H. U.)
6. *A New Classification of Infinite Series:* By A. S. Chessin. (University Circulars, J. H. U.)

On motion the meeting adjourned.

Chas. Lane Poor,
Secretary.

GEOLOGICAL CONFERENCE OF HARVARD UNIVERSITY, NOVEMBER 12, 1895.

The Pirna and Kirchberg Zones of Contact Metamorphism. By T. A. Jaggar, Jr.

Attention was especially called to the superb maps of the Saxon Geological Survey, the four sections Nos. 124, 125, 135 and 136, making up the Kirchberg area, and sections Nos. 82, 83 and 102 the Pirna series. Each section is accompanied by an 'Erläuterung,' or pamphlet of descriptive text. The scale of the maps is 1: 25,000, and all landmarks which can be of assistance in using these maps in the field are indicated in print, such as 'quarry,' 'brewery,' 'paper factory,' etc. Specimens were exhibited of the various metamorphic series in separate suites, each suite being arranged in a long tray; a colored strip of tape attached to each set of specimens had its duplicate pinned across the map showing locality.

The Kirchberg granite stock lies on the northern flank of the Erzgebirge, south of Leipzig and southwest of Dresden, between the streams Mulde and Göltzsch. Its outcrop forms

a perfect ellipse, about seven miles long in a northeast-southwest direction, and four to five miles in breadth. It is nearly surrounded by hills of 'hornfels' or metamorphosed clay slate, whose elevation above the more easily weathered granitite is well shown by the drainage. To the southeast lies a portion of the Schlema stock of turmaline granite, also bordered by its metamorphic rim of hornfels. The metamorphic belt belongs to the non-fossiliferous Phyllite series and higher, the Cambrian slates. The alteration due to the intrusion of the granitic masses is similar in both formations. The highly crystalline zone next to the granite has an average thickness of 300m., and the outer zone of spotted schist varies from 450m. to 550m. in thickness. These measurements are made perpendicular to the original cooling surface of the granite; the many mining shafts in the vicinity of Schneeberg afford accurate data for such measurement, and show that the alteration zones are determined solely by the position of the granite, quite independently of the dip and strike of the sediments.

The Kirchberg granitite stock consists of a coarse, porphyritic outer shell enclosing a somewhat later intrusion of finer grain; the contact of the two, however, shows that the older magma was still partially fluid when the younger was intruded. At the contact with the hornfels the granitite often interpenetrates the slaty folia in very fine veinlets showing extreme liquidity at the time of intrusion.

At the contact the hornfels contains muscovite, biotite, quartz, andalusite and magnetite; at a distance from the contact it becomes more schistose in character, and greenish-black oblong spots appear, which are chiefly concretions of carbonaceous pigment; going further, the spots disappear, but the slaty folia still retain a crinkled appearance, until finally the unaltered clay slates are reached. The unaltered phyllite and the andalusite hornfels show great similarity in chemical composition, indicating molecular rearrangement rather than actual acquisition of new material.

The Pirna area lies southeast of Dresden, between the great Lausitzer granite stock on the northwest and the gneiss of the Erzgebirge on the southeast. A concise summary of the geology of this contact series is given by R. Beck, Tschermaks Mineralog. und Petrog. Mittheilungen XIII–4–p. 290, 1893.

Southwest from the town of Pirna the altered sediments of Cambrian, Silurian and Devonian age lie in apparently conformable succession, highly inclined and striking northwest. Various granitic masses cut them, producing different metamorphic changes, according to the nature of the rock affected.

The Lausitzer Granite consists chiefly of an oligoclase-quartz-biotite granitite, which in the vicinity of Dohna is replaced by a micaceous granite. A syenite occurs further south in oblong masses parallel to the strike of the sediments, and this varies locally to hornblende-granitite in one case and to quartz-angite-diorite in another. In the southeast part of the area occurs a large granitite stock near Markersbach, characterized by pneumatolytic phenomena and intersected by veinlets which contain cassiterite, topaz, blende, zinnwaldite, turmaline, fluorite, etc. Near it the turmaline-granite of Gottleuba, which shows much kataclastic alteration, occurs in a number of long lenticular masses which lie in general parallel to the strike of the associated sedimentaries. This indicates that dynamo-metamorphism played a part in the changes wrought in this basin, though Beck considers them chiefly contact phenomena, the dynamic action having taken place long after the early igneous intrusions and affecting both granites and stratified rocks alike.

The contact metamorphism observed is as follows:

The Phyllites are altered into spotted schists and andalusite-hornfels as in the Kirchberg area and elsewhere. Chlorite gneiss is altered to biotite gneiss, a somewhat unusual process (see Beck, l. c. and also C. Callaway, Geol. Mag. (3) 10. 535–538. 1893).

Silurian clay slates are altered to 'knoten' schists and nearer the contact to Cordierite-hornfels. Contrary to the rule observed in the phyllites, the 'knoten' in thin section are spots of *less* pigment than the mass of the schist, and in the hand specimen appear as tiny blisters or nodal points. A carbonaceous lydite or siliceous schist becomes graphitic near the granite contact.

Among the various members of the Weesensteiner grauwacke (Devonian) formation is an interesting series of gneissoid rocks between Goppeln and Tronitz. They are feldspathic and full of cordierite, crystals of the latter mineral often attaining great size.

The diabase sheets which generally lie interbedded among the slates and conglomerates are amphibolized, and the diabase tuffs are altered to Actinolite schists.

Further may be mentioned the metamorphic limestones and their associated ore bodies. The chief interest of the region lies in the diversity of the rocks affected by contact metamorphism.

GEOLOGICAL CONFERENCE OF HARVARD UNIVERSITY, NOVEMBER 19, 1895.

Theories of Ocean Currents. By W. M. DAVIS.

The sufficiency of difference of equatorial and polar temperatures to cause a convectional circulation in the ocean has been strongly disputed by many under Croll's leadership, but warmly upheld by others, notably by Carpenter and Ferrel. The following arguments bear on the discussion:

The cross-equator current of the Atlantic, flowing obliquely from the South Atlantic eddy to the North Atlantic eddy, continually carries a great volume of water from one hemisphere to the other. The only available path for its return is as an undercurrent. Assuming that the surface currents are wind-driven, and that there is no other cause for movement of deep waters than wind-driven surface currents, it follows that the movement of the deep Atlantic water should cross the equator from north to south. But the distribution of bottom temperatures shows very clearly that the bottom movement here is from south to north. Hence the assumption that no cause but surface wind is operative cannot be permitted, and the most available other cause is gravitative convection.

On the other hand, the annual variation of velocity in the surface currents favors their direct control by surface winds rather than their indirect control by convection, as argued by Ferrel. For, if moving as part of a convectional circulation, they should move fastest when the poleward temperature gradient in the ocean water is strongest; and this is in late summer, when the heat equator of the ocean lies poleward of the geographic equator, and the total difference of equatorial and polar temperatures is found in the minimum distance. But if driven by the winds the surface currents should move fastest in winter, for then the poleward temperature gradient in the atmosphere is strongest and then the winds blow fastest. As far as facts are reported, the eastward surface drift of ocean waters in the temperate zones is strongest in the winter season. The critical point in this argument turns on the essential constancy of temperature in the polar oceans, on account of which the variation of the poleward temperature gradient in the water depends only in the position of the oceanic heat equator; while in the atmosphere the polar temperature changes greatly with the season, and hence, in spite of the greater distance from heat equator to pole in the winter hemisphere, the gradient is then strongest on account of the great winter increase in the polar and equatorial temperature contrast. Oceanic convection should be strongest in the summer hemisphere, but atmospheric convection and wind-driven currents in the winter hemisphere. (Fuller publication in the Proceedings, Boston Society of Nat. Hist.)

T. A. JAGGAR, JR.,
Recording Secretary.

NEW BOOKS.

The Structure and Life of Birds. F. W. HEADLEY London, Macmillan & Co. 1895. Pp. xx+412.

Milk, Its Nature and Composition. C. M. ACKMAN. London, Adam and Charles Black. New York, Macmillan & Co. 1895. Pp. xiv+180. $1.25.

Geological Biology. HENRY SHALER WILLIAMS. New York, Henry Holt & Co. 1895. Pp. xix+395.

Cambridge Natural History, Vol. V. Peripatus, ADAM SEDGWICK; Myriapods, F. G. SINCLAIR; Insects, DAVID SHARP. London and New York, Macmillan & Co. 1895. Pp. xi+584. $4.00.